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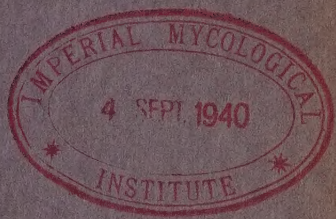

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Bulletins on disease subjects written for farmers and "popular" articles of a similar nature are not included in the *Veterinary Bulletin*. Those of a sufficiently important nature, are, however, included in *Index Veterinarius*; so also are certain review articles, presidential addresses, congress proceedings, etc., where the title conveys as much information as could be given in an abstract of a few lines. For information of this nature, readers of the *Veterinary Bulletin* are referred to *Index Veterinarius*, where titles of all publications indexed by the bureau are fully cross-referenced.

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IMPERIAL BUREAU OF ANIMAL HEALTH

THE

VETERINARY BULLETIN

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DISEASES CAUSED BY BACTERIA AND FUNGI

KRANEVELD, F. C., & UMBOH, T. E. W. (1939). Het verspreiden van miltvuurkiemen door het lichaam na intracutane injectie. **[The Spread of Anthrax Bacilli in the Body After Intradermal Injection].**—*Ned.-ind. Bl. Diergeneesk.* **51.** 1–15. 6 tables. [11 refs.] [English and German summaries].

The authors carried out numerous experiments on g. pigs which they injected intradermally with lethal doses of anthrax bacilli or anthrax spores. The average interval before death occurred was 54 hours. The spores took somewhat longer to kill than the bacilli. It was found also that septicaemia occurred 16 hours at the earliest after infection. The rapidity of septicaemia and death was found to be dependent also on the size and on the volume of the infecting dose, the effect being more rapid when the organisms were injected in a greater amount of suspension fluid.—A. W. MÖLLER.

SCHRADER, & RÖSGEN. (1939). Gibt es Milzbrandkeimträger? **[The Carrier Problem in Anthrax].**—*Dtsch. med. Wschr.* **65.** 920–922. [1 ref.]

An account of cutaneous anthrax in a butcher who had slaughtered an infected cow. The butcher's sister also contracted anthrax, evidently through using her brother's comb; both of them recovered under treatment. *Bacillus anthracis* was demonstrated in the blood of both persons and in the blood of their father, a brother and of three other persons who had helped at the slaughter, none of whom had shown any signs of anthrax. These latter were healthy carriers of infection.
—J. E.

CARMICHAEL, J. (1939). **Bovine Tuberculosis in the Tropics, with Special Reference to Uganda. Part I.**—*J. comp. Path.* **52.** 322–335. 2 figs., 3 tables. [Numerous refs.]

Few cases of TB. have been recorded among the indigenous cattle of the tropics. Attempts to assess the incidence of the disease have been rendered difficult by the general apathy of the natives, the absence of meat inspection, and the absorbing interest of the major epizootics. In recent years, owing to closer administration, more attention has been devoted to the disease. Uganda supports about two million cattle. Most are of the Zebu type, indigenous to the whole of equatorial Africa. The others are either pure-bred or crossed Ankole cattle. The latter exist as a highly characteristic group, and occupy sharply defined areas of territory. Recent investigations combining tuberculin testing and P.M. examination have shown that, while the incidence of TB. in Zebu cattle is low, a large proportion of Ankole cattle are affected. Observations in abattoirs for the period

1931-1936 inclusive indicated that the incidence in Ankole cattle was at least 25 %, while that in Zebu cattle did not exceed 1 %. More recently, a tuberculin test survey has detected as many as 77 % of reactors in some Ankole herds. Reactors are rare in Zebus.

The distribution of lesions in most abattoir cases is intrathoracic. Abdominal lesions are usually secondary, and generalization is rare. Up to the present 39 strains of tubercle bacillus have been isolated from Ankole and Zebu cattle. All have proved to be typical dysgonic bovine types of normal virulence.

Since both breeds of cattle are maintained at pasture under similar conditions, it appears that the Zebus owe their resistance to natural immunity. Spread of infection among susceptible animals is assisted by the penning of sick animals and calves, by herding in kraals during the night and by congregating near fires to avoid biting flies.—D. D. Ogilvie.

Verge, J., & Drieux, H. (1939). Les formes légalement contagieuses de la tuberculose bovine. [**The Legally Contagious Forms of Bovine Tuberculosis**].—*Bull. Acad. vét. Fr.* **12.** 403–412.

Detailed criteria are given for the recognition of the notifiable forms of bovine TB. in the live and dead animal. Advanced TB. of the lung is considered to include multiple or massive tuberculous lesions in the bronchi and trachea, even though the lung tissue be unaffected. Any tuberculous lesion in the intestinal or uterine mucous membrane is included in the scope of this order, while TB. of the udder is held to include any tuberculous lesion of the supramammary lymph node, even if the glandular tissue of the udder is not involved. The paper is very useful from the aspect of veterinary jurisprudence; it concerns the law of 7th July, 1933.

—R. O. Muir.

van der Schaaf, A., & van Zwieten, M. (1939). De beteekenis van den tuberkelbacil van het humane type voor de bestrijding der tuberculose onder het rundvee. [**The Importance of Human Type Tubercle Bacilli in the Control of Bovine Tuberculosis**].—*Ned.-ind. Bl. Diergeneesk.* **51.** 16–28. 2 tables. [Numerous refs.] [English and German summaries].

An account of a herd of cattle in East Java in which many tuberculin-test reactions had occurred without lesions' being found on P.M. examination. A cow which reacted doubtfully to the ophthalmic and intradermal tests was killed, and a lesion was found in the left bronchial lymph node from which human type tubercle bacilli were isolated. The exact origin of the infection was not determined; human TB. is prevalent in the country. It is assumed that the positive reactions that occurred in cattle free from lesions may have been due to infections with the human type of bacillus.—A. W. Möller.

Emanuiloff, I. (1939). Zur Frage der Verbreitung der Schweinetuberkulose in Bulgarien unter besonderer Berücksichtigung der Differentialdiagnose der Lymphknotenveränderungen. [**Swine Tuberculosis in Bulgaria with Special Reference to Differential Diagnosis of Lesions in Lymph Nodes**].—*Z. InfektKr. Haustiere.* **54.** 285–301. 3 figs. [Numerous refs.]

Out of 1,865 swine examined in the Sofia abattoir, 60 were infected with TB. of the retropharyngeal or mandibular lymph nodes and 9 with TB. of the mesenteric l.nn. All except 4 were cases of incomplete primary complex; the 4 complete complexes had the primary lesion in the tonsils. E. describes and gives photographs of the effect of TB. in the l.nn. of the head and neck, this description being similar to that given by Nieberle for the intestinal l.nn., *viz*, resorption of fat and replacement by collagen. He considers this to be diagnostic of TB.—P. S. Watts.

GRIFFITH, A. S. (1938). **Avian Tubercle Bacilli in the Udder of a Goat—Change of S to R Forms.**—*J. comp. Path.* **51.** 151–165. 2 tables.

A goat inoculated subcutaneously with a strain of *Mycobacterium tuberculosis* (avian type), was examined periodically for nine years. The strain became localized in the udder and was constantly recovered in the secretion. At first no visible change in the character of the organism was observed. Later, clear-cut S and R strains were isolated and eventually only the R form was obtainable. Both S and R types were of full virulence for fowls and rabbits. Serological tests showed that an anti-S serum agglutinated the S type to about 1 : 1,600 and the R type at a lower titre. All the S strains examined absorbed agglutinins completely from this serum, whereas R strains were ineffective.

During life, the goat constantly reacted to avian tuberculin. It died 11 years after injection. P.M. the right half of the udder was atrophied, but showed no signs of TB.—R. E. GLOVER.

KÁRNIK, T. (1939). Adatok a baromfigümőkór elterjedéséhez népies tenyészetekben. **[Data on the Incidence of Avian Tuberculosis among Fowls Bred by Peasants by Traditional Methods].**—*Thesis, Budapest.* pp. 11. 1 table. [9 refs.] [German summary].

An examination of 4,834 hens on 166 farms in 27 localities of the transdanubian region of Hungary revealed the presence of avian TB. on 38 farms with a fowl population of 1,617, of which 323 reacted to tuberculin tests.

It was found that the incidence was higher in good layers than in poor layers, higher in imported Rhode Island Reds than in the local breeds, and higher also in fowls kept in closed runs under good conditions than in birds on free range.—E. M.

CAPORALE, G. (1939). L'influence du " facteur R " sur l'implantation et la généralisation du B. tuberculeux aviaire. **[The Influence of the Duran-Reynals Factor on the Pathogenesis of Infection with the Avian Tubercle Bacillus].**—*Boll. Sez. ital. Soc. int. Microbiol.* **11.** 144–157. 3 tables. [17 refs.] [In French].

Following a review of the chemical nature of the Duran-Reynals factor and its mode of action, the type and extent of lesions were compared in five two-month old puppies injected subcutaneously with 2 c.c. of a suspension of avian tubercle bacilli (fully virulent for the fowl) with or without 1 c.c. of an extract of rabbit testicle. The testicular extract (containing the Duran-Reynals factor) affected the lymphatic capillaries in some manner, since the puppies injected with tubercle bacilli alone developed a permanent subcutaneous nodule with no other lesion while in those which received extract as well, the nodule was quickly absorbed and tuberculous lesions were found in the regional lymph node at autopsy after given intervals. Experiments performed in six fowls and two rabbits with the avian tubercle bacilli recovered from the puppies, demonstrated that testicular extract accelerated the diffusion of the tubercle bacilli, but that passage through the dog appeared to attenuate the avian tubercle bacillus for both the fowl and the rabbit.
—R. O. MUIR.

GRIFFITH, A. S. (1940). **The Proportional Frequency of the Human and Bovine Types of Tubercle Bacilli in Human Pulmonary Tuberculosis in the Middle and South of Scotland.**—*J. Hyg., Camb.* **40.** 365–376. 3 tables. [12 refs.]

Of 515 cases examined 484 were of the human type and 31 of the bovine type. With the exception of the strains from one case all the bovine strains were culturally typical and fully virulent for rabbits.—F. T. BOYLE.

WEILL-HALLÉ, B. (1938). Les limites de la prémunition de l'espèce humaine contre la tuberculose par le vaccin Calmette-Guérin. [**Limits of Human Premunition against TB. by means of BCG**].—*Pr. méd.* **46.** 209. [4 refs.]

The effect of vaccinating children with BCG on a large scale in France is reported. The author strongly favours the subcutaneous inoculation of a small dose of the organism, *viz.* 0·05 mg. which, in his view, is the largest amount which can be given without producing local abscess formation.

He also suggests that the premunition of children should not be confined to families affected with open TB., but should be applied to all infants who may be exposed to infection.—R. E. GLOVER.

BIRKHAUG, K. E. (1938–1939). **The Rôle of Vitamin C in the Pathogenesis of Tuberculosis in the Guinea-Pig. I. Daily Excretion of Vitamin C in Urine of L-Ascorbic Acid Treated and Control Tuberculous Animals. II. Vitamin C Content of Suprarenals of L-Ascorbic Acid Treated and Control Tuberculous Animals. III. Quantitative Variations in the Haemogram of L-Ascorbic Acid Treated and Control Tuberculous Animals. IV. Effect of L-Ascorbic Acid on the Tuberculin Reaction in Tuberculous Animals. V. Degree of Tuberculosis in L-Ascorbic Acid Treated and Control Tuberculous Animals.** —*Acta tuberc. scand.* **12.** 89–104 and 359–372, and **13.** 45–51 and 52–66. 16 figs. on 6 plates. 14 tables. [Numerous refs.] [In English].

Two groups, each of 12 normal, tuberculin-tested g. pigs receiving a diet of turnips, hay, oats and brown bread, were maintained under observation for a month, during which time saturation studies with *l*-ascorbic acid and routine haematological investigations were carried out. To the animals of one group, daily doses of 10 mg. of *l*-ascorbic acid in aqueous solution were then given by stomach tube; the animals in the other group served as controls. After the first week of this differential treatment, all animals were inoculated subcutaneously with a highly virulent, dysgonic bovine strain of *Mycobacterium tuberculosis*, in a dosage said to correspond with that yielding about 500 viable colonies in ten weeks upon Löwenstein's egg medium, or fatal to normal g. pigs in approximately 100 days. Tuberculin tests were carried out on the 24th, 51st and 62nd days after infection, and 64 days after infection all animals were killed and autopsied. [The results of the experiment form the subject matter of all five papers.]

A significant depression of the urinary excretion of vitamin C was found following infection in the case of the control groups, whereas the animals receiving the vitamin C supplement showed an increased excretion. The tissue of the adrenal glands of the control group was also found to contain very little vitamin C. The animals in the control group showed an average loss in weight of 6·7 % during the period following infection, whereas an average weight gain of 10 % was shown by the vitamin C group. A few haematological changes were noted in the case of animals receiving the vitamin C supplement, but B. concludes that more protracted studies are required in order to elucidate the effects obtained. The intradermal tuberculin tests carried out 51 and 62 days after infection showed marked differences between the two groups, there being a relatively mildly inflamed type of reaction to the test in the control group, without central necrosis. Histological studies of the lymph nodes, spleen, liver, lungs, kidneys and adrenals showed that caseation and necrosis were less marked in the vitamin C group, and that in these animals also there were more collagenic fibres at the tubercular foci, with less dispersion of bacilli than in the controls. [These results lend support to the view, for which there is increasing evidence, that vitamin C metabolism is increased in tuberculosis.]—ALASTAIR N. WORDEN.

I. Follis, R. H., Jr. (1938). **Tuberculosis Infection in Animals Prevented from Developing Hypersensitivity.**—*Proc. Soc. exp. Biol., N.Y.* **39.** 49–51. [11 refs.]

II. Follis, R. H., Jr. (1938). **The Effect of Preventing the Development of Hypersensitivity in Experimental Tuberculosis.**—*Johns Hopk. Hosp. Bull.* **63.** 283–304. 12 figs. on 2 plates, 3 tables. [17 refs.]

III. Sabin, Florence R., & Joyner, A. L. (1938). **Tubercular Allergy without Infection.**—*J. exp. Med.* **68.** 660–676. 15 figs. on 3 plates, 1 table, 1 chart. [Numerous refs.]

I. The onset of hypersensitivity was prevented in tuberculous g. pigs by the daily inoculation of Old Tuberculin. Infected control g. pigs showed normal tuberculous lesions, whereas three out of eight of the tuberculin-treated animals developed pulmonary lesions containing unusually large numbers of acid-fast bacilli. In a second series of experiments control infected g. pigs were inoculated with glycerin in saline and with saline alone. The extent of the lesions in the tuberculin-treated and glycerin groups was greater than in the saline group; glycerin-treated and saline-treated animals as well as the O.T. treated group had lesions containing large numbers of bacilli. It is therefore concluded that development of these lesions was not entirely dependent upon a lack of tuberculin sensitivity.

II. This is a fuller version of I and in addition deals with the question of antibodies and hypersensitivity. Antibodies were found in non-hypersensitive animals, but the significance of this was not determined.

III. G. pigs were rendered hypersensitive to tuberculo-protein by the repeated intradermal injection of active tuberculo-protein. When tuberculo-phosphatide was added to the protein the skin reactions were necrotic and closely resembled those obtained by the intradermal inoculation of tuberculin in tuberculous g. pigs. This addition gave rise to the formation of large numbers of epithelioid cells. Smaller doses of tuberculo-protein were required for sensitization by the intradermal route than by the subcutaneous or intraperitoneal routes.—E. C. H.

Pagel, W. (1940). **The Effect of Blood Serum on the Growth of Tubercle Bacilli in the Depth of Liquid Media.**—*J. Path. Bact.* **50.** 111–119. 7 tables. [8 refs.]

Luxuriant growth of tubercle bacilli was promoted in glycerol peptone water or Hirchner's synthetic medium, incubated at 37°C. for 10–20 days, by the addition of normal human serum or serum from cases of isolated pulmonary phthisis, but not by serum from cases of chronic disseminated tuberculosis. The serum of resistant animals such as the horse or rat promoted growth just as well as the serum of the ox, sheep or rabbit—animals of much lower resistance. Growth-promoting power could be induced in a serum by absorption with acid-fast organisms or *Bacterium coli* but not with staphylococci or diphtheria bacilli. The growth-promoting power of the serum of rabbits and g. pigs was not affected by vaccination with heat-killed tubercle bacilli.—R. O. Muir.

Johnston, L. M. (1940). **Culture of Tubercle Bacilli. The Early Demonstration of Tubercle Bacilli by Microscopic Examination of Smears from Cultures.**—*Amer. Rev. Tuberc.* **41.** 120–123. 3 tables. [4 refs.]

Microscopic examination of films of material, scraped from the entire surface of slope cultures of suspected tuberculous secretions, after incubation for 10, 20 and 30 days, is recommended as a very helpful diagnostic method in cases of urgency. Although saving an average of 21·3 days in 54 positive cases and being

unreliable in only two of these, the method is considered unsuitable for routine diagnosis due to the greater labour entailed, the possibility of confusion with acid-fast saprophytes, and the risk of contamination during the three exposures of the culture tube.—R. O. MUIR.

I. STEPAĬKIN, P. P. (1939). O nakhozhdenii B. erysipelatis suis u severnykh oleneĭ. [**Occurrence of** *Erysipelothrix rhusiopathiae* **in Reindeer**].—*Sovyet. Vet.* No. 5. pp. 52–53.

II. REVNIVYKH, A. G. (1939). O nakhozhdenii Bac. erysipelatis suis u severnykh oleneĭ. [**Swine Erysipelas Infection in Reindeer**].—*Ibid.* No. 8. pp. 76–77.

I. S. states that he examined material from "hoof disease" of reindeer. The material concerned came from arthritic and tendon sheath lesions of an affected animal or animals. It had been sealed in glass pipettes by another worker in 1933 and had been stored for some years.

S. states that he isolated an *Erysipelothrix*. He speaks of the large numbers of rodents that die in the tundra and of the habit of reindeer of eating carrion, and suggests that the organism isolated may be the cause of deaths of rodents and that reindeer may become affected from infected rodents, this possibly being an explanation of the causation of "hoof disease".

II. This paper criticizes the conclusions drawn by STEPAĬKIN in I, on the grounds that his samples, being several years old, may well have been contaminated and that no evidence has been brought forward in support of his suppositions which are not based on facts.—E. MARTIN.

ITIKAWA, O. (1939). **Artificial Infection of the Goat, Sheep and Dog with** *Bacillus mallei*.—*Jap. J. vet. Sci.* **1.** 583–601. 16 figs. on 8 plates, 1 table. [9 refs.] [In Japanese: abst. from English summary].

Experimental glanders of the goat, sheep and dog is described.

A goat was inoculated subcutaneously with two loopfuls of a 24-hour culture of *Pfeifferella mallei* and died after 15 days. On autopsy, nodules and ulcers were demonstrated on the nasal septum, and nodules in the liver.

A sheep was inoculated similarly with the same dose; after 20 days it appeared to overcome the acute illness. When killed at this stage there was an abscess at the site of inoculation. The lungs showed oedema and hyperaemia with the formation of nodules the size of a "red bean". The nodules had necrotic centres surrounded by endothelioid cells, fibroblasts and oxydase-positive cells merged into a soft, complete, fibrous capsule, but no giant cells were seen. There was marked hyperplasia of the regional lymph nodes and cloudy swelling of the liver. Glanders bacilli were detected only at the inoculation site.

Three dogs were infected by the ingestion of an unspecified quantity of infected mule's lung. One died after acute illness on the 27th day; another developed skin ulcers over a knee joint and died on the 60th day, and the third showed ulcers on the mouth and unilateral conjunctivitis and died on the 55th day. Autopsy revealed haemorrhage and oedema of the lungs, nodule formation and hyperplasia of the liver, enlargement of the spleen, ulceration of the caecum and ileum, and enlargement of the mesenteric lymph nodes. Glanders bacilli were detected histologically, but could not be cultivated.—D. D. OGILVIE.

HIRATO, K. (1939). **Studies on** *Shigella equirulis* (*Bacterium pyosepticum*). **I.**—*Jap. J. vet. Sci.* **1.** 376–412. 14 figs. on 2 plates, 7 tables, 2 graphs. [Numerous refs.] [In Japanese: abst. from English summary].

Twenty-seven strains of *Bact. equirulis* were isolated from cases of pyaemic arthritis in foals, from cases of infectious anaemia with concurrent septicaemia,

and from cases of verminous aneurysm or of strangles in adult horses. Mucoid and non-mucoid types of growth are described and details of fermentation reactions are given. The non-mucoid variant was less viable and slightly less virulent than the mucoid form which killed mice and g. pigs respectively in minimal intraperitoneal doses of 0·2 and 1 c.c. of broth culture. Intraperitoneal injection of a three-month old foal with 3 c.c. of broth culture proved fatal in 26 hours, while two colts, aged four and 14 months, recovered after irregular fever and leucocytosis and their sera showed agglutinating, precipitating and complement-fixing properties. Subcutaneous injection of a colt with 1 c.c. of culture produced only a localized abscess of short duration. Serological reactions with the different strains were extremely heterogeneous.—R. O. MUIR.

WILSON, J. E. (1940). **Fowl Typhoid in Scotland.**—*Vet. J.* **96.** 53–55.

W. describes the prevalence of *Salmonella gallinarum* infection in the island of Lewis. The disease was previously believed to be confined to Wales and the contiguous counties in England. It is suggested that the infection was probably imported into the island about 30 years ago.

W. found that the methods of housing and feeding employed by the islanders were unsatisfactory and tended to spread the disease. Eradication is to be attempted by agglutination tests, vaccination and sanitary measures.—G. C. B.

PATERSON, J. D. (1940). **The Peculiar Cultural Requirements of a Strain of *Brucella abortus*.**—*Vet. Rec.* **52.** 179–180. 1 table.

P. describes an unusual strain of *Br. abortus* which was isolated from a bovine aborted foetus. He inoculated the stomach contents of bovine aborted foetuses into the condensation water of liver agar slopes containing defibrinated blood, as well as on to the usual liver agar medium. This was in order to detect whether *Vibrio foetus* were present or not.

The strain in question only grew on the liver agar slope containing blood, in an atmosphere of 10 % CO_2. It was morphologically similar to the usual *Br.a.* strains and it was pathogenic for g. pigs, which developed specific agglutinins for *Br.a.* The strain was found to grow on plain liver agar only after the third generation after isolation from g. pigs. By cross-absorption tests it was antigenically similar to the ordinary smooth strains of *Br.a.*

P. suggests that enriched media should be employed in routine examinations of suspected material, in case such strains be missed.—D. L. HUGHES.

GATT, J. E. H. (1939). **Undulant Fever and the Maltese Milk Problem.**—*Arch. internat. Brucelloses.* **2.** No. 2. 45–51. [In English].

This article does not give any data on the undulant fever problem in the Maltese Islands since 1931. During the year 1930–31 notified civilian cases of undulant fever totalled 1,471, a case incidence of 6 per 1,000, with 85 deaths. The incidence of infection in goats in 1931 was 15 %.—C. V. WATKINS.

DUBOIS, C. (1939). Au sujet de diverses questions controversées concernant les vaccins antibrucelliques en excipient irrésorbable. **[Some Controversial Points Regarding Anti-Brucella Vaccines in Non-Adsorbable Excipients].** —*Bull. Acad. vét. Fr.* **12.** 276–283. [1 ref.]

D. has since 1935 obtained satisfactory results with a vaccine made by suspending an avirulent strain of *Br. suis* in liquid paraffin and lanolin. VELU and ZOTTNER have since the same date used a somewhat similar vaccine, but made with *Br. abortus*. Both vaccines have, until recently, been accepted as containing live organisms. Velu and Zottner, following NELIS, have, however, recently stated that their vaccine,

which is made up in 25% lanolin, is in fact dead within a few days at 18°–20°C. and they have also stated that D.'s vaccine (according to them containing 10% lanolin) although still containing living organisms at nine days is dead within 12 days.

D. states that, on the contrary, his vaccine (containing a larger dose of *Brucella —suis* instead of *abortus*—made up with 9% lanolin, and also containing lycopodium powder) still contains living organisms after 10–12 days at 18°–20°C. and, in fact, for 14 to, at times, 30 days.

In the second part of the article D. takes exception to Velu and Zottner's statements that their results may be taken in conjunction with the much more extensive ones obtained by D. himself, to show the value of a brucella vaccine made up in liquid paraffin and lanolin, pointing out that such successful results are contrary to all previous experience with dead vaccines (as in fact that of Velu and Zottner is, on their own showing) and that in his opinion Velu and Zottner have failed to adduce evidence sufficient to prove that their vaccine is effective. He quotes them as stating in 1936 that it was useful, but that it was impossible to form any definite conclusion under Moroccan conditions where the disease is mild and the risks of infection small, but in 1939 as saying that their results in the same country proved its value and confirmed those of D. A further point is made, *viz*, that D.'s vaccine consists of one injection whilst Velu and Zottner's needs 2–4 injections.

D. concludes with data showing the satisfactory results obtained with his (" living but harmless ") vaccine.—A. W. STABLEFORTH.

RENOUX, G. (1939). Vaccination préventive du cobaye et de la brebis contre l'infection brucellique (Brucella Mélitensis). [**Preventive Vaccination of G. Pigs and Ewes against** *Br. melitensis* **Infection**].—*Thesis, Montpellier.* pp. 104. 9 tables. [Numerous refs.]

R. gives a useful review of the literature and describes preliminary vaccination experiments with dead vaccine, live avirulent vaccine, bacterial chemical extracts and an " associated vaccine " consisting of a mixture of a " totally avirulent " *Br. abortus* strain (B.112) and an endotoxin product of these bacteria known as " Antigen G.L." All the experimental results were controlled by a special allergic test with an " endo-protein " antigen, by serum and milk-whey agglutination tests, by cultures from the blood and milk, by examination of vaginal swabs and by cultural tests of liver, spleen, precrural and iliac lymph nodes, genital organs and of any obvious focus of disease.

As a result of the work he had done R. found that dead vaccines may cause an agglutination response but no allergy, whereas an avirulent, live strain may cause allergy but no agglutination response ; g. pigs often remained uninfected after direct inoculation with blood or ground-up organs when cultures from these tissues were infective ; conversely, g. pigs often became infected after inoculation with vaginal mucus and milk when cultural tests from the material were negative. The avirulent S strain of *Br.a.* used alone was feebly protective for animals and man ; the association with antigen G.L. was first tested by G. ROMAN [*V.B.* **9.** 75.] and the results are included in the present article.

R. found that abortion does not occur regularly in infected ewes.

He describes vaccination tests on male g. pigs (78% successful) and on unfertilized and pregnant g. pigs. It is difficult to immunize pregnant g. pigs. Lesions caused by test dosage, however, were definitely fewer than in the controls. Intradermal injection of the vaccine proved more efficient than subcutaneous injection. Good results were also obtained in nine out of ten tests of the method on ewes.

—C. V. WATKINS.

DUBOIS, C. (1938). Essai de vaccination préventive de la brebis contre la mélitococcie par l'injection, dans le derme, de *Brucella abortus* vivants. [**Tests of Intradermal Vaccination of Ewes with Live** *Br.a.* **to Protect against** *Br. melitensis*].—*C. R. Soc. Biol. Paris.* **112.** 575–576. [See also *V. B.* **10.** 271].

Twenty-five maiden ewes were vaccinated intradermally with 0·3 c.c. saline suspension of a 48-hr. agar culture of "*Br. abortus* P. vivants" and, together with 25 controls, were then mated; 25 days after vaccination they all received a subcutaneous test dose of 1 c.c. of a saline suspension of a live 60-hour agar culture of virulent *Br.m.* Almost all the pregnant sheep aborted, and D. considered that the experiment should be repeated, using a less virulent strain of *Br.m.*—R. O. M.

SHTRITER, V. (1937). Allergicheskaya diagnostika brutselleza u ovets s pomoshch'yu brutsellora Dubois. [**On the Diagnosis of Sheep Brucellosis by the use of an Intradermal Test with the "Dubois Brucellore"**].—*Brucellosis in Sheep.* pp. 233–249. 1 fig., 6 tables. [13 refs.] Moscow: Viem Publ. Dept.

In preliminary tests on sheep on the North Caucasus Experimental Sheep Farm, it was found that the diagnostic value of brucellore [*V. B.* **9.** 97.] was almost the same whether it was prepared from cultures of the *Br. suis* strain received from DUBOIS, from a stock strain of *Br. melitensis* or from a strain isolated locally from sheep. All later tests were made with the Dubois strain, chiefly because it was said to be non-pathogenic to man.

From numerous tests made on sheep on the Farm, naturally or experimentally infected with brucellosis, and also on healthy sheep in Abkhasia, where brucellosis was not known to occur naturally, the chief advantages of the brucellore allergic test were shown to be its high sensitivity and the relatively small cost and simplicity of preparation of the antigen. In many cases, however, brucellore caused non-specific reactions, owing to the impurities it contained, *e.g.* bacterial cell debris, products of bacterial lysis, etc. It is further said that brucellore may exert a sensitizing effect on the test animals, precluding its use in a test in the course of controlling the infection.

KOLMER, J. A., BONDI, A., HOWARD, Mary, & RULE, Anna M. (1939). **Studies in Active Immunization against Undulant Fever. I. Antibody Production by Rabbits Immunized with Heat-Killed** *Brucella abortus* **Alone and Simultaneously with Heat-Killed** *Bacillus typhosus.*—*J. Immunol.* **37.** 489–506. 1 tables. [Numerous refs.]

A heat-killed vaccine of *Br.a.* engendered the production of agglutinins, bacteriotropins and protective antibodies in rabbits when injected subcutaneously. These antibodies were produced in approximately the same degree by rabbits immunized simultaneously against *Br.a.* and *Salmonella typhi* and by rabbits immunized by *Br.a.* alone.

Mice are susceptible to virulent *Br.a.* and *Br. melitensis* upon intra-abdominal inoculation with large numbers and succumb to peritonitis with associated septicaemia. Mice have been found suitable for protective tests with the sera of rabbits immunized with a heat killed vaccine of *Br.a.*

The sera of rabbits immunized with a heat-killed *Br.a.* vaccine contained large amounts of protective antibody for mice against *Br.a.* and much larger amounts against *Br.m.*—F. T. BOYLE.

STAHL, W. H., PENNELL, R. B., & HUDDLESON, I. F. (1939). **A Study of the Protein-Nucleates of the Species of the Genus** *Brucella.* **I. Chemical Constitution of the Protein-Nucleates. II. Biological Properties of the**

Protein-Nucleates.—*Tech. Bull. Mich. agric. Exp. Sta.* No. 168. pp. 22. 10 tables. [Numerous refs.]

The chemical constitution and biological properties of protein-nucleates and their protein and nucleic acid fractions were examined. A protein-nucleate had been produced under the name of " brucellergen " and used as a skin-testing agent in detecting undulant fever in human beings. Smooth, intermediate rough and rough forms of *Brucella* were included in the studies now described. The method of isolating the protein-nucleate is described and also the methods employed in separating the protein and nucleic acid fractions. The total yield obtained from smooth strains of *Br. abortus*, *Br. melitensis* and *Br. suis* was from 12–13·7 % of the dry weight of the cells, whilst intermediate R and R strains yielded 18–18·2 %. The protein component comprised about 70–75 % of the protein-nucleate derived from the S strains and about 60 % of that prepared from the intermediate R and R strains. The nitrogen partition is given. All the proteins concerned contain traces of sugars, but no amino sugar.

Guanine, adenine and cytosine, but no thymine or uracil, were found in the nucleic acids. Both pentose and desoxypentose sugars were present and studied quantitatively. The results of precipitation studies with the protein-nucleate and protein components from S strain preparations show that they are not type specific and that the nucleic acid possesses no precipitating power. The protein-nucleate and protein components from the intermediate R and R strains reacted only slightly with homologous and heterologous antiserum. Their nucleic acids also possessed no precipitating power. The protein-nucleate and protein components elicit non-type-specific reactions in brucella-sensitized rabbits. The protein-nucleate and its fractions were found to be non-toxic.

[The authors use the term protein-nucleate in preference to the commoner term nucleo-protein. Strictly speaking, the latter refers to proteins isolated from nuclear material, irrespective of the amount of nucleic acid present, which may vary with the method of preparation. More than one protein-nucleate may be contained in a nucleo-protein.]—S. J. Gilbert.

Rossi, P., & Saunié, L. M. (1939). Les microbes anaérobies dans la pathologie interne du cheval. [**Anaerobes in the Internal Diseases of the Horse**].—*Bull. Acad. vét. Fr.* **12.** 226–232. [12 refs.]

The authors describe a train of clinical symptoms in the horse said to be due to infection with anaerobic organisms. Cases may be divided into peracute, acute and subacute. The peracute form is characterized by rigors, profuse sweating, abdominal pain, congested conjunctivae which later become jaundiced, and crepitating oedema of the dependent parts of the body. Death occurs in 18–24 hours, and it is followed by immediate P.M. change and gaseous distention of the carcass. The acute form is similar to the peracute, but may take 60 hours or so to evolve. The subacute form resembles piroplasmosis or equine infectious anaemia. The mucous membranes are icteric and there is a progressive anaemia.

Hypertrophy and degeneration of the liver are very marked at P.M. examination, and the kidneys are very large and pulpy. *Clostridium septique* may be recovered from the visceral organs, and from the areas of oedema which develop before death.—D. L. Hughes.

Dukalov, A. I., Apollosova, P. A., & Kulakov, K. A. (1935). K voprosu izucheniya tak nazyvaemogo X-bradzot karakul'skikh ovets. [**Study of the So-Called " X-Bradsot " Disease of Karakul Sheep**].—*Bull. Uzbek. nauchn.-issled. vet. Inst., Tashkent.* No. 4. pp. 10–12.

Reports had been made in 1928 that an atypical " bradsot " was the cause of

death in sheep in parts of Uzbekistan. A commission studied the question in this area and reported that there was no scientific evidence that deaths of sheep in the area were due to a disease of the " bradsot " type.—E. MARTIN.

I. BENGTSON, I. (1938). **Studies on** *Perfringens* [*A. welchii*] **Toxin.**—*Bull. Hlth Org. L.o.N.* **7.** 802–806. 3 tables.

II. —. (1938). **The Necessity and Possibility of Establishing a Standard for Sordelli Antitoxin.**—*Ibid.* 807–814. 4 tables.

III. —. (1938). **Gas-gangrene Antitoxin** (*Vibrion septique*). **Proposal to Change the Strength of the Standard Solution.**—*Ibid.* 815–817.

IV. WEINBERG, M., & GUILLAUMIE, M. (1938). **The Necessity for Changing the Technique of the** *Perfringens* [*A. welchii*] **Antitoxin Assay.**—*Ibid.* 818–826. 4 tables. [4 refs.]

I. B. stresses the importance of the composition of the medium used for the production of *Clostridium welchii* toxin. The presence of the haemolytic factor is important. Media prepared from dried, chopped bullock's heart or from infusion broth with proteose peptone and cysteine, fails to produce the haemolytic factor. Beef infusion broth with certain other peptones produces a haemolytic toxin. This haemolytic factor may be separated from the rest of the toxin by filtration through graded collodion membranes. Antitoxins prepared against toxins lacking the haemolytic factor fail to protect mice against toxin containing the haemolytic factor.

II. *Cl. sordelli* was originally isolated from a case of gangrenous appendicitis. It has since been isolated from catgut which gave rise to acute fatal infections, and from other cases of acute appendicitis. In culture it is very similar to *Cl. sporogenes*, but differs from it in producing a lethal toxin for rabbits, mice and g. pigs.

It is provisionally suggested that the unit of antitoxin should be 0·06668 mg. of the dry preparation kept at the National Institute of Health, Washington, U.S.A.

III. A gas-gangrene antitoxin standard has been kept in London and Copenhagen. This preparation is issued from London and 1 c.c. contains 100 international units (British standard). The same preparation is issued from Copenhagen; 1 c.c. contains 20 international units. It is proposed to get both institutions to issue a preparation of which 1 c.c. shall contain 50 international units.

IV. The authors discuss some of the difficulties in the assay of *Cl. welchii* antitoxin. The weight of the test dose of toxin may vary from sample to sample. The weight of a test dose of a single sample of toxin may vary according to the standard antitoxin used for the assay. There may be considerable variation in the titre of a single antitoxin, according to the toxin against which it is being titrated.

To avoid some of these difficulties it is suggested that the same antitoxin and the sample of toxin be used when making comparisons with antitoxic sera from other institutes. It is desirable that the standard *Cl. welchii* toxin should be one which contains all the toxic factors. Future work should be directed towards establishing a reliable method for measuring the curative titre of *Cl. welchii* antitoxins.—D. L. HUGHES.

I. BAUDET, E. A. R. F. (1935). Over dermatomycosen van dierlijken oorsprong voorkomend bij den mensch. [**Dermatomycosis of Animal Origin in Man**]. —*Geneesk. Gids.* **13.** 697–727. 9 figs. [14 refs.].

II. BAUDET, E. A. R. F. (1939). De beteekenis der dierlijke dermatomycosen voor den mensch. [**Importance of Animal Mycoses for Man**].—*Tijdschr Diergeneesk.* **66.** 756–759.

I. Certain human dermatomycoses are transmissible from animals to man as well as from man to man and certain of those of animal origin in man can spread

further from man to man. Microsporosis of animal origin in man occurs mostly in adults and attacks any part of the skin covered with hair. *M. canis* is the most common ; this organism also attacks horses.

Trichophytosis of human origin occurs mostly in the endothrix or neo-endothrix form. In animals the endo-ectothrix form is the most common ; the microspore type of trichophytosis is almost confined to animals and is not very infectious to man. *T. granulosum* is very prevalent among horses and can infect man. *T. album* is the most important of the megaspore type of trichophyton ; it is found in cattle, dogs and horses and it also spreads to man. Whenever megaspore trichophytosis occurs in man, it is of animal origin even if the disease was contracted from man.

M. quinckeanum of the mouse and cat and *M. gypseum* of the dog are infectious to man and *M. gallinae* of the fowl may also infect man.

II. A summary of I.—A. W. Möller.

DISEASES CAUSED BY PROTOZOAN PARASITES

Roubaud, E., & Provost, A. (1939). Autostérilisation au cours d'infections à terminaison mortelle par *Trypanosoma cazalboui* (*vivax*) chez les ruminants. **[Spontaneous Disappearance of the Parasites from the Blood during the Course of Fatal Infection with *Tryp. vivax* in Ruminants]**.—*Bull. Soc. Path. exot.* **32.** 613–616. [3 refs.]

The authors describe three cases of trypanosomiasis in which death occurred weeks or months after apparent recovery. A kid, inoculated with the South African strain of *Tryp. vivax*, died 79 days after the parasites had disappeared from the blood. A sheep, normally highly susceptible to this strain, was not infected by inoculation of blood taken from the kid on the day before its death. Two other sheep were likewise infected with the American strain [which has been called *Tryp. viennei* by some authors—Ed.] One died after the blood had been free from trypanosomes for nearly a year, and the other died after six months. A control kid was not infected by inoculation with the latter's blood. There is insufficient evidence, as yet, to state whether or not the parasites persist in the nerve centres.—M. L. Bingham.

Rodhain, J. (1938). Étude d'une souche de *Trypanosoma cazalboui vivax* d'origine du Ruanda. **[Study of a Strain of *Tryp. vivax* from Ruanda]**. —*Acta Conv. tert. trop. malar. Morbis, 1938.* Pt. 1. pp. 691–695. 2 tables. [4 refs.] Amsterdam : Societas Neerlandica Medicinae Tropicae. [In French].

Cattle from Ruanda were found to be infected with *Tryp. vivax* on arrival at the zoological gardens at Antwerp. The trypanosome proved inoculable to goats and sheep, and, in the case of sheep, caused severe disease sometimes resulting in death. Rabbits and monkeys resisted infection. In sheep, examination of lymph node juice gave rather better results in detecting infection than blood examination, but the trypanosomes were sometimes seen in the blood when they were absent from the lymph node juice. Neither method is reliable for the definite exclusion of the possibility of infection.—U. F. Richardson.

Nieschulz, O. (1938). Ueber Trypanosoma viennei, ein Rindertrypanosoma aus Südamerika. [*Tryp. viennei* [*vivax*] **from Cattle in South America**].—*Acta Conv. tert. trop. malar. Morbis, 1938.* Pt. 1. pp. 707–711. [5 refs.]

Amsterdam: Societas Neerlandica Medicinae Tropicae. [In German: Discussion p. 711 in French].

Observations are recorded on a strain of *Tryp. viennei* [*Tryp. vivax*] from an ox imported from Dutch Guiana. The organisms were similar morphologically to the African forms of *Tryp. vivax*, except that they did not show as great a variation in length of individuals. As with *Tryp. vivax*, rabbits were occasionally infected after inoculation, but other experimental animals were not infected. The organism appeared to have some pathogenicity for sheep, in which animals severe swelling of the eyelids was a characteristic clinical manifestation. It appeared to have no pathogenicity for goats, and little for cattle.

Naganol and tryparsamide proved valueless for treatment, but antimosan caused a clearing of the peripheral circulation for about seven days. A course of seven weekly injections failed to produce complete recovery.—U. F. RICHARDSON.

REES, C. W., & GARLICK, G. G. (1939). **Experimental Transmission of Bovine Venereal Trichomoniasis.**—*J. agric. Res.* **59.** 769–775. 1 table. [5 refs.]

The authors describe the results of infecting 15 cows and heifers with *T. foetus* by intravaginal inoculation with bacteria- and virus-free cultures, or by coitus with an infected bull. By the former method the incubation period was two days, whilst by coitus it averaged 11 days, but there was no evidence that the method of transmission had any effect on the course of the disease. Infection developed in every female served by an infected bull, and in 58% of all vaginal examinations *T. foetus* was found. In eight of the animals so infected there was failure to conceive for a time; in some the next gestation was normal, but pyometra developed in others. Of the remaining cases, infection in a pregnant heifer had no ill effects, and as a cow she showed little resistance to reinfection. Others infected as heifers either before or at coitus showed, as cows, marked resistance. One became a non-breeder. Infection in a bull is described in which infection remained for 20 months; potency was apparently not affected. The following control measures are suggested:–(1) breed infected bulls only to infected or recovered cows, (2) breed clean bulls to non-infected cows and heifers and (3) breed cows with unknown histories with semen from non-infected bulls.—M. L. BINGHAM.

CHRISTENSEN, J. F. (1939). **Sporulation and Viability of Oöcysts of *Eimeria arloingi* from the Domestic Sheep.**—*J. agric. Res.* **59.** 527–534. 4 tables. [4 refs.]

Sporulation and viability tests on oocysts of *E. arloingi* were made under conditions such as exist in the natural environment. The results derived thus have a direct application to control measures. In shallow tap water or in natural faecal pellets there was little or no sporulation at 0°–5°C., it was normal or abundant at 20°–25°C. and there was none at 40°C., but in oocysts kept in putrefying faecal sediment covered with shallow water there was none even at room temperature. Failure to sporulate under these conditions and at high temperatures is due to lack of oxygen. Unsporulated oocysts were viable in some cases up to ten months at 0°–5°C., but were killed in a few days at 40°C. Since drying proved fatal to oocysts in several days or a few weeks, C. emphasizes the importance of dry, well drained land for sheep pasturing. In addition, good hygienic methods of lamb raising are essential to prevent infection by contamination of the feed.—M. L. B.

LEVINE, P. P. (1940). **Sub-Clinical Coccidial Infection in Chickens.**—*Cornell Vet.* **30.** 127–132. 2 tables. [6 refs.]

This is a survey of the incidence in New York of subclinical coccidial infection

by all species (except *Eimeria hagani*) in White Leghorns in their first year of production. These birds were actually affected with other diseases. L. shows that 92% of the intestinal tracts examined revealed no gross evidence of infection, despite the fact that all species of coccidia had been recovered from them. He was surprised to recover *E. tenella* in 23% of eight-month-old birds. *E. necatrix* was recovered from 38% of the cases. Figures are also given for the other four species of *Eimeria*. [The number of birds examined was small for the purpose of percentage estimation of occurrence, but the results serve as a further indication of the very general distribution of coccidia of all species.]—C. Horton Smith.

Kotlán, S., & Pellérdy, L. (1936–1937). Kisérleti vizsgálatok a házinyúl májcoccidiosisáról. **[Experimental Liver Coccidiosis in Rabbits]**.—*Közl. összehas. élet- és kőrtan köréböl.* **26.** 647–659, and **28.** 105–110. 11 figs. [20 refs.]

The authors record the results of research into the morphology and biology of *Eimeria stiedae*, its pathogenicity for rabbits and the micropathology of the lesions caused. They confirm the view now generally held that *E.s.* is the sole eimeria which causes hepatic coccidiosis of the rabbit.

It was found possible to distinguish between the oocysts of *E.s.* and other rabbit eimeria oocysts despite their close resemblance to each other, *E. media* oocysts being smaller and lighter in colour and possessing a conspicuous residual body in contradistinction to *E.s.* which has a small residual body, and *E. irresidua* which has none at all. The diversity of opinion regarding the presence of a residual body in *E.s.* oocysts is accounted for by the possibility of other oocysts having been taken for *E.s.* oocysts. The authors state that they themselves were always able to observe the presence of a residual body during the process of sporulation.

Schizogony began five days after infection and could be observed until the 14th day. All oocysts obtained from the faeces, but barely half of those obtained from the bile ducts, sporulated within 72–96 hours.

Rabbits were found to be resistant to *E.s.* infection during the first fortnight of their life. Susceptibility was highest at the age of 3–4 weeks and then declined. From the age of three months onwards, resistance was proportionate to age and was strong after four months.

The microscopic and macroscopic lesions induced by *E.s.* in the biliary system are described in great detail with numerous photographic illustrations.
—E. Martin.

Rees, C. W. (1940). **The Effects of Injection into Bovidae of Emulsions of Anaplasma-Infected Ticks.**—*Vet. Med.* **35.** 20–21. 1 table, 1 photograph. [3 refs.]

A bull and a heifer were each inoculated with saline emulsions made from engorged females of *Boophilus annulatus* and *B. microplus*, engorged larvae of the same species, and engorged nymphs of *Rhipicephalus sanguineus*. The species of *Boophilus* were proved to be infected with *Babesia argentina* and assumed to carry anaplasms, whilst the *Rh. sanguineus* nymphs were proved to be infected with *Anaplasma*.

Some months later the animals were tested by the inoculation of anaplasm blood, and both contracted infection. It is concluded that the tick emulsions neither caused anaplasm infection nor conferred immunity.—U. F. Richardson.

MALBRANT, R. (1939). Rickettsiose canine au Congo français. [**Canine Rickettsiasis in the French Congo**].—*Bull. Soc. Path. exot.* **32.** 908–913.

M. describes a disease of dogs in the French Congo in which rickettsial bodies resembling *R. canis* were demonstrated in the monocytes of the peripheral blood, lungs and liver. The disease occurred in three forms, a nervous form characterized by convulsions, paralysis and symptoms of encephalo-meningitis, a typhoid form characterized by fever, tachycardia, dyspnoea and lymphadenitis, and a chronic form in which the symptoms might be very variable. The disease differed from the canine rickettsiasis described in North Africa in that nervous symptoms were very common. It differed from distemper in that it commonly attacked adults, and in the presence of lymphadenitis and tachycardia. The infection was transmissible to g. pigs by inoculation, causing fever, emaciation and orchitis, and the sera of affected animals gave positive agglutination results with a strain of *Proteus vulgaris*. On the other hand, the virus is said to be filtrable and the disease is highly contagious. M. suggests that the rickettsial infection may be only a complication, and he evidently suspected that distemper might also be involved.—U. F. RICHARDSON.

MALBRANT, R. (1939). Existence de *Rickettsia conjunctivae* du mouton au Congo français. [*R.c.* **in Sheep in the French Congo**].—*Bull. Soc. Path. exot.* **32.** 907–908.

M. records outbreaks of rickettsial conjunctivitis in sheep in the French Congo, and one suspected extension of the disease from sheep to calves. Although the disease in sheep was very alarming, causing keratitis in many animals, recovery was very rapid.—U. F. RICHARDSON.

GIROUD, P. (1939). Réactions d'immunité locale provoquées par des inoculations répétées de rickettsies. [**Local Immunity Reactions Caused by Repeated Inoculation with Rickettsiae**].—*Bull. Soc. Path. exot.* **32.** 251–258. 2 tables, 2 graphs. [3 refs.]

Intradermal inoculation of rabbits with scrotal fluid from g. pigs affected with orchitis after artificial infection with murine typhus or " boutonneuse fever," causes the formation of an inflammatory nodule which may become necrotic. For 12 days after the primary inoculation greater concentration (1 : 25) of scrotal fluid had to be used to produce local reactions, but after 20 days the sensitiveness increased until a fluid dilution of 1 : 1,000 produced a reaction. This sensitiveness gradually declined. Animals which had received repeated intradermal injections of scrotal fluid proved immune on intraperitoneal inoculation.—U. F. RICHARDSON.

SABIN, A. B. (1939). **Biological and Immunological Identity of Toxoplasma of Animal and Human Origin.**—*Proc. Soc. exp. Biol., N.Y.* **41.** 75–80. 1 table, 2 charts. [11 refs.]

It is argued that morphology as the only guide to a diagnosis of toxoplasms is misleading and confusing as is evidenced by the present controversy as to whether the intracellular parasites observed in avian malaria are toxoplasms or stages of plasmodia. The diagnosis of toxoplasm can only be accepted if the parasite has the capacity to multiply and to produce disease in a variety of hosts including mammals and birds.

Working with a strain of toxoplasm isolated from a case of encephalitis in a child, S. showed that the parasite was pathogenic to mice, rabbits and fowls, and that two rabbits which recovered from intracutaneous inoculation of an animal strain were immune to the human strain.

When suspensions of the brains of mice infected with the human strain were exposed for 10 min. to hyperimmune serum prepared against the animal strain they lost their infectivity.—U. F. RICHARDSON.

MOLLARET, P., & BONNEFOI, A. (1938). Un cas de *Biokoshio* (*sodoku* après griffade et morsure de chat), avec périorchite résolutive. Considérations sur le rôle du chat dans la transmission de *Spirillum morsus muris*. [**A Case of Rat-Bite Fever due to Scratches and Bites of a Cat. Role of the Cat in the Transmission of** *Sp. minus*].—*Bull. Soc. Path. exot.* **31.** 855–866. 1 chart. [Numerous refs.]

A 12-year-old boy was bitten and scratched by a cat and 16 days later he was given antirabies vaccine ; rat-bite fever was, however, soon diagnosed, and arsenical treatment was given. The boy recovered. A marked periorchitis comparable to that occurring in g. pigs following intraperitoneal inoculation with *Sp. minus* was a feature of the case. *Sp. minus* could not be demonstrated in the blood of the patient but the serum was spirillolytic. The evidence concerning the cat as a vector of rat-bite fever is inconclusive. Further work is needed to ascertain whether it may become a true reservoir of the parasite or whether it becomes merely a mechanical vector, after eating an infected rat or mouse.—M. L. BINGHAM.

KOLOCHINE-ERBER, B., & STEFANOPOULO, G. J. (1939). A propos d'une enquête sur les leptospiroses en Afrique équatoriale française. [**Leptospirosis in French Equatorial Africa**].—*Bull. Soc. Path. exot.* **32.** 919–923. [9 refs.]

The authors refer briefly to the technique of sero-diagnosis of *L. icterohaemorrhagiae* in the French colonies, and record the results of their own investigations into the presence of leptospira in French Equatorial Africa. Attempts to isolate spirochaetes by g. pig inoculation with blood or urine from four suspects or with organs from rats caught in the vicinity, failed ; this may have been due to the existence of races of leptospira only slightly pathogenic for g. pigs, and to the fact that rats are not the sole vectors of infection. Out of 124 agglutination tests carried out on various strains of leptospira, only 27 positive results were obtained, 16 of which were of low titre. The tests are probably influenced by such factors as the time of collection and state of preservation of the serum, as well as by environmental conditions.—M. L. BINGHAM.

DISEASES CAUSED BY VIRUSES

STANLEY, W. M. (1939). **The Architecture of Viruses.**—*Physiol. Rev.* **19.** 524–556. [Numerous refs.]

This review first describes recent advances in virus research and then attempts to show how the continuation of this work may help to link together in a coherent manner the atomic theory of matter, the germ theory of disease and the cell theory of life.

The plant viruses and vaccinia are considered in most detail, but there is no reason to consider that they differ in any essential from other viruses. Despite the great similarity between active and inactive virus, in every case so far studied it has been possible to demonstrate that inactivation has been accompanied by a measurable change in one or more of the physical, chemical or serological properties. It has been found impossible to separate virus activity from protein in any way and the various nucleo-proteins must be considered to represent the virus in an essentially pure form. In size, viruses form an unbroken series from accepted

protein molecules to accepted living organisms. The method of multiplication is discussed and it is admitted that it may be merely an autocatalytic reaction resembling, but more complicated than, that by which trypsin and pepsin are known to multiply. The mechanism by which virus is synthesized in a diseased cell must be very similar to that by means of which normal protein constituents are synthesized in a normal cell. As viruses can be removed from cells, examined and then reintroduced into cells, their study may throw considerable light upon cellular physiology.

The chemist regards the properties of viruses as a logical extension of the expression of chemical structure, but many pathologists still think of viruses as living agents. The futility of attempting to differentiate the living from the non-living state, and the importance of recognizing the fundamental similarity in structure of all entities from the largest to the smallest are stressed. The designation of certain particles as molecules or cells may also be merely a matter of personal preference. The nature of the bonds between units within cells or within large protein molecules is not known to differ in any fundamental respect from the forces already known to exist in atoms. The chemical, physical and biological properties of matter whether atoms, molecules, germs or cells are directly dependent on the structure of the matter, and the results of the work with viruses have permitted the conclusion that this structure is fundamentally the same, regardless of the state in which it exists.—JOHN FRANCIS.

STIMPERT, F. D. (1939). **Cultivation of Certain Viruses Using Yolk of Chick Embryo as Route of Injection.**—*Proc. Soc. exp. Biol., N.Y.* **41.** 483–485. [3 refs.]

Previous reports have shown that the rickettsiae of Rocky Mountain spotted fever and typhus fever, as well as the Eastern and Western strains of equine encephalomyelitis virus have been cultivated in the yolk sac of the developing chick embryo.

In this study, fertile eggs were incubated at 39°C. and then injected with 0·1–0·5 c.c. of inoculum after which they were incubated at 37·5°C. The inoculum was injected directly into the yolk sac through a small hole in the air sac end of the egg. The hole was then closed with melted paraffin. Infectivity tests were made by inoculating 10% suspensions of ground embryonic tissues. 1 c.c. doses were given to rhesus monkeys when working with poliomyelitis virus, and 0·03 c.c. of the other viruses were given to white mice. Three serial egg passages of Eastern and Western equine encephalomyelitis and St. Louis encephalitis virus were made by this method. Six-day eggs were used and embryonic tissues were harvested and pooled for infectivity tests or egg passages three days after inoculation. In all cases the embryos were dead and it is suggested that they should be harvested earlier. It was not found possible to transmit poliomyelitis virus in this way. —JOHN FRANCIS.

BEST, R. J. (1939). **Virus Activity as a Property of Some Protein Molecules.**—*J. Aust. Inst. agric. Sci.* **5.** 94–102. 5 figs. [Numerous refs.]

B. reviews some of the more interesting facts relating to the properties of certain viruses, particularly those causing disease in plants. He exemplifies changes in virulence by showing that the virulent form of the virus of " curly top " of sugar beet is modified to a mild strain by passage through either a species of *Chenopodium* (a common weed) or a tolerant sugar beet which act as symptomless carriers; the virulence of the mild strain may be restored by passage through chickweed. He discusses the nucleo-protein nature of these viruses, together with

possible explanations of their power of self-multiplication and their serological behaviour. He emphasizes the need for close co-operation of physicists, chemists and biologists of all kinds on such problems, and his paper is instructive to the veterinarian concerned with the study of viruses and virus diseases.—T. S. G.

FOGEDBY, E. F. (1940). Lindholm laboratoriets M.K. vaccinationsforsøg 1938–39. **[Foot and Mouth Disease Vaccine Research Work at Lindholm, 1938-39].** —*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 1082–1099. Discussion pp. 1091–1099. [English translation appeared in *Vet. Rec.* **51.** 1307–1309. (1939)].

F. points out that adsorbed vaccine against F. & M. disease is a product of Danish research begun in 1934 and that the German Riems vaccine is an adaptation of the Danish process. In the Danish process tongue virus is adsorbed in $Al(OH)_3$ and then held at 37°C. for 72 hours to attenuate it, whilst at Riems attenuation is carried out by the addition of formalin. The Danish vaccine was proved to be non-dangerous and of definite immunizing value for g. pigs but it was not until the time of the 1938-39 epizootic that large scale tests were possible on cattle. [A few of the earlier results are given, but the other articles should be seen for the main results ; see below and *V. B.* **10.** 509.]

It has been found possible to grow the virus on calf embryo tissue and to prepare a vaccine with it, but culture virus is not obtainable in such high concentrations as natural virus.—J. E.

I. TOUSSIENG, E. (1939). Forsøgsstationens Virksomhed, specielt m.H.t. Fremstilling af Mund- og Klovesygevaccine og de hidtil gjorte Erfaringer med Vaccination mod Mund- og Klovesyge i Praksis. **[Report on the Preparation and Use of Foot and Mouth Disease Vaccine (Research Station, Lindholm)].**—*Medlemsbl. danske Dyrlaegeforen.* **22.** 8–14.

II. SUURBALLE, A. (1939). Beretning om Vaccinationer mod Mund- og Klovesyge i Tidsrummet 16. November—31. December 1938. **[Report on Vaccination against Foot and Mouth Disease in Denmark from November 16th to December 31st, 1938].**—*Ibid.* 255–271.

III. ANDERSEN, S. (1939). Veterinaerdirektoratets Forsøg med Zonevaccinering mod Mund- og Klovesyge i Sønderjylland i Februar 1939. **[Report of the Zonal Vaccination against Foot and Mouth Disease in South Jutland in February, 1939].**—*Ibid.* 287–294. 1 table.

IV. CHRISTENSEN, E. H. (1939). Beretning over foretagen kollektiv Vaccination mod Mund- og Klovesyge i fynske Mejerikredse i Foraaret 1939. **[Report on Mass Vaccination against Foot and Mouth Disease in the Fyn Dairy District Early in 1939].**—*Ibid.* 294–300.

V. SEIT, B. (1939). Orienterende Forsøg med Mund- og Klovesygevaccine. **[Trials with Foot and Mouth Disease Vaccine].**—*Ibid.* 328–338.

VI. SUURBALLE, A. (1939). Beretning om Vaccinationer mod Mund- og Klovesyge i Tidsrummet 1. Januar—30. June 1939. **[Denmark : Report of Vaccination against Foot and Mouth Disease, January 1st—June 30th, 1939].**—*Ibid.* 551–582. 2 tables.

VII. SUURBALLE, A. (1939). Vaccination mod Mund- og Klovesyge. **[Vaccination against Foot and Mouth Disease].**—*Maanedsskr. Dyrlaeg.* **51.** 483–486.

I. Research at Lindholm in 1938 had three main aims :– (1) the production of maximum quantities of virus for vaccine preparation, (2) trials on vaccine dosage, and (3) production of culture virus.

It was found possible to obtain as much as 40 g. of virus from one bovine by

the intramucosal injection of the whole dorsum of the tongue with a total of 2–4 c.c. of virus, the animal being under luminal narcosis. It was thus possible to produce enough virus for 20,000 doses of vaccine a week. Virus was sent to the Serum Laboratory, Copenhagen where it was used for preparing a vaccine adsorbed on $Al(OH)_3$ [see also FOGEDBY, above]. The dose eventually adopted was 10 c.c. of a 1% virus suspension. This vaccine was used on a dozen herds in danger of infection. Its true prophylactic value could not be determined as most of the herds became infected within a very few days of vaccination. Second and third doses were given in some cases, to animals which did not contract the disease quickly and it is claimed that the vaccine did confer immunity on them. Research on culture virus is still proceeding.

II. In this large-scale trial of vaccination a single injection of a large dose of $Al(OH)_3$ virus was used—60 c.c. for cattle over two years old, 40 c.c. for those between six months and two years old and 20 c.c. for calves. Sheep, goats and swine were not vaccinated. 74,535 animals in 4,170 herds were vaccinated at a time when the disease was raging (43,321 cases in non-vaccinated animals). 345 (8·3%) of the vaccinated herds became infected, 192 within six days of vaccination, 142 between six and 14 days and 11 later than 14 days. [The bulk of the article contains individual reports on herds.]

III. A secondary wave of infection began to spread northwards into Jutland at the end of 1938: it was shown that the A type of virus was concerned [the O type caused the main invasion earlier]. An attempt was therefore made to create an immune zone of cattle across the southern part of Jutland by means of A type virus vaccine in herds infected previously, and with a polyvalent A-O type vaccine in herds not previously infected. The vaccine was applied twice with a 14-day-interval by 15 veterinary surgeons assisted by 17 veterinary students at a charge of 70 øre per head. Doses were 15, 10 and 5 c.c. respectively for the three classes of animals mentioned in II above. 57,795 cattle in 3,347 herds were vaccinated. Statistics indicate that vaccination was effective, though the disease was waning in March. Only 11 cases occurred among vaccinated cattle.

This paper contains the detailed instructions of the Veterinary Directorate concerning the application of the vaccine.

IV. As in Jutland, so on the island of Fyn a secondary wave of infection by A type virus occurred at the end of 1938. A large-scale vaccination trial was therefore undertaken in several dairy districts in which 68,724 cattle were vaccinated in a similar manner to that described in III above, except that the charge was greater (2·40–0·80 kr.). The disease occurred subsequently in nine vaccinated herds 5–21 days after the first dose.

V. An account of a small-scale, controlled experiment with some complete herd trials on the value of various vaccines against artificial or natural infection :– (1) virus O vaccine given in one large dose (as in I), (2) the same given in two doses at various intervals and in various amounts, (3) and (4) as in (1) and (2) but using virus A. All types of vaccine proved to be efficacious to a valuable extent against the homologous virus.

VI. A summary of all vaccinations carried out in the first half of 1939, including data of articles III, IV and V above. A total of 311,070 animals in 18,294 herds were vaccinated, somewhat less than one-quarter by the single dose method and the rest by two doses as in III. Nearly half the vaccine issued was bivalent (A-O virus). The bulk of the paper consists of individual reports on infection after vaccination, effect of vaccination on the health, local reactions and milk yield of the vaccinated animals. In the great majority of vaccinated animals there was no important disturbance to health or milk yield, but many reports of

disturbances due to the inoculation were made about individual herds or animals.

It is concluded that the vaccine is harmless to use, confers a useful immunity within six days and protects animals from infection, as is shown by the record of a 1·7 % infection rate in 22,464 vaccinated herds in comparison with natural infection occurring during the same period in all of 50,267 non-vaccinated herds.

S. regards this success as the turning point in the control of F. & M. disease.

VII. A general summary of the Danish experience of vaccination which was reported in detail in articles II–VI.—J. E.

—. (1939). Diskussionsindlaeg ved Mund- og Klovesyge-Mødet i Københavns Dyrlaegeselskab den 11. December 1938. **[Discussion on Foot and Mouth Disease by the Copenhagen Veterinary Society, 11th December, 1938].** [Speakers: BENDIXEN, H. C., MAGNUSSON, H., PLUM, N., GLUD, BREGENDAHL, LAVESSON, L., NIELSEN, J. P., JENSEN, O. A., KNUDSEN, C. N., & PETERSEN, H.]—*Medlemsbl. danske Dyrlaegeforen.* **22.** 35–51.

BENDIXEN related that he was conducting an enquiry into serum therapy, methods of feeding and treatment of affected teats and feet of affected cattle: results would be reported later. MAGNUSSON discussed the value of various kinds of vaccine, serum and blood therapy from the practical viewpoint and referred to the possibility that wild birds act as spreaders of infection. He did not believe that the påssage of persons between Denmark and Sweden had anything to do with the spread of the disease to Sweden. PLUM stated that picric acid was useful in preventing and treating infection of the teats. In the recent outbreak Danish vaccine was not used to the best advantage in view of the short supply available; also it was evidently not devoid of infectivity for the vaccinated cattle. Much research was still necessary. The Veterinary Director [H. PETERSEN] said that vaccination was necessary in all countries threatened and that it had proved valuable in reducing losses. GLUD believes that the disease is commonly spread by dairy vehicles and proposed a draft law to enforce disinfection of such vehicles during an outbreak. He also stated that cod-liver oil was useful for treating the teats and feet of infected cattle. BREGENDAHL doubted the value of vaccination and antiserum. LAVESSON was of the opinion that infection was commonly spread by sacks and similar material and that wind-borne infection was not an important danger. NIELSEN discussed certain difficulties in the supply of vaccine and said that citrated convalescent blood was valuable, particularly as cows treated with it suffered less loss in milk yield than untreated cows. JENSEN said that serum therapy is valuable, but that large doses (700–1,000 c.c. for a large beast) must be given.—J. E.

I. JERLOV, S. (1939). I vilken utsträckning äro djur, som genomgått mul-och klövsjuka, smittförande? **[The Extent to which Animals, which have Passed Through Foot and Mouth Disease, are Infective].**—*Svensk VetTidskr.* **44.** 295–312. 1 table, 1 graph.

II. FORSSMAN, J., & MAGNUSSON, H. (1939). I vilken utsträckning äro djur, som genomgått mul-och klovsjuka smittoförande? **[The Extent to which Animals, which have Passed Through Foot and Mouth Disease, are Infective].**—*Ibid.* 401–416. 2 tables. [16 refs.]

III. JERLOV, S. (1940). Till diskussionen om kroniska virusbärare vid mul- och klövsjuka. **[Virus Carriers in Foot and Mouth Disease].**—*Ibid.* **45.** 46–55. 1 table.

I. J. makes a review of the literature which, he considers, supports the opinion that virus carriers play a part in the spread of F. & M. disease and he describes some new instances in Skåne in which other sources of infection could

not be traced, *viz*, instances in which the disease occurred in herds not previously infected, 8–110 days after the introduction of cattle which had recovered from the disease 51–215 days before, and six instances in which new uninfected cattle contracted the disease 36–138 days after the herds to which they were brought had recovered from infection. In Skåne there is a 26 days' isolation order for cattle which have recovered from natural infection; this is thought to be too short. In J.'s opinion virus carriers are a danger, particularly between the fourth and sixth month after recovery. [See, however, II, in which it is stated that at the times these cases occurred, F. & M. disease was present in the district.]

II. The authors do not believe in the alleged importance of virus carriers and argue that J.'s cases of new infection might have arisen otherwise—through the agency of vehicles, human beings or by other means. The disease was present and spreading at the time in Skåne. They give the same opinion about an outbreak in Switzerland in 1928 during which it was alleged that virus carriers had been involved. If the virus carrier theory were correct, it follows then that the number of carriers would dwindle progressively from the date of original infection, yet J.'s cases predominated between four and six months after infection and few were involved earlier.

III. A reply and a claim that, in the absence of precise controlled experiments, J.'s view that virus carriers do exist is based on good circumstantial grounds. Further particulars are given of his cases reported in I.—J. E.

LAVROVSKIĬ, N. E., KINDYAKOV, V. I., & DORONIN, N. N. (1939). O khloroform-vaktsine protiv yashchura. [**Chloroform Vaccine against Foot and Mouth Disease**].—*Sovyet. Vet.* No. 1. pp. 27–29.

The authors conducted experiments in order to verify the good results claimed to have been achieved in Russia with chloroform vaccine in 1935–36 during an outbreak of F. & M. disease, when 6,226 head of cattle were inoculated with chloroform vaccine prepared according to the modified method of GALEA [*V. B.* **4.** 513]. It was stated that the vaccinated cattle acquired immunity while the other animals contracted F. & M. disease. [An expedition dealt with the outbreak in question; no report of the work of the expedition can be traced.]

In the investigation now reported, 505 head of cattle aged 1½–12 years were used in three groups completely isolated from each other and from the rest of the herd. The first two groups of 358 head were vaccinated, and the third group of 147 head served as controls. After artificial infection in identical circumstances, 62·2 % of the vaccinated animals and 63·3 % of the controls contracted the disease.

—E. MARTIN.

—. (1939). Belgique. Circulaire ministérielle concernant la désinfection dans la fièvre aphteuse. [**Belgium: Ministerial Circular Concerning Disinfection in Foot and Mouth Disease**].—*Bull. Off. internat. Epiz.* **17.** 899–903.

The circular deals with the use of sodium hydroxide as a disinfectant on infected premises. Solutions of 0·5 and 1 % are recommended as the most effective agents available. The lower concentration is used for application to animals, for disinfection of the hands and clothing of workers, for mangers, and for drinking troughs. The 1 % solution is used for vehicles, utensils, faeces and urine, and with the addition of lime for walls and floors of buildings. Infected manure is dealt with by spraying with caustic soda solution, and then building in a mound on a base of uninfected manure 10 inches deep, the mound being covered with straw and earth to a depth of 4 in. During the 15 days for which this is allowed to stand, the temperature rises high enough to destroy all infective agents other than bacterial spores. Infected animals should be treated daily with the weak

solution on the mouth, feet, anus and vulva, a measure which, by cicatrizing the lesions, tends to prevent secondary invaders and to limit the spread of virus. After the recovery of the animals, thorough cleansing of the premises is carried out, including spraying finally with the 1 % solution in lime-wash.—J. B. BROOKSBY.

MEYER, E. (1939). Ein Beitrag zur Frage der Empfänglichkeit des Damwildes für Maul- und Klauenseuche. **[Susceptibility of Fallow Deer to Foot and Mouth Disease].**—*Berl. Münch. tierärztl. Wschr.* Oct. 13th. 619–620.

A herd of 60 head of fallow deer pastured in a wooded park of about 750 acres successfully resisted an epidemic of F. & M. disease which attacked 206 cattle in the same park. The severity of the disease was such that two of the cattle died and seven had to be destroyed. Since the area was small, and the diseased cattle were present for a period of a month, it is suggested that fallow deer are not susceptible to F. & M. disease.—J. B. BROOKSBY.

MAGNUSSON, H. (1939). Ein Fall von Maul- und Klauenseuche beim Elch. **[A Case of Foot and Mouth Disease in an Elk].**—*Dtsch. tierärztl. Wschr.* **47.** 509–511. 3 figs. [7 refs.]

M. suggests that wild deer may be important in the spread of F. & M. disease. The cadaver of a young elk found near infected premises showed typical lesions on the tongue, hard palate and dental pad, and on one foot. Attempts to demonstrate the virus in the mouth lesions and red bone-marrow failed, inoculation of the material into g. pigs and swine being without result. Diagnosis of the disease was based on negative bacteriological examination, the characters of the lesions and their occurrence at the predilection site.—J. B. BROOKSBY.

RICHTER, H. A. (1939). Ist das Maul- und Klauenseuchevirus auf dem Allanto-Chorion von Hühnerembryonen nach der Methode von Peragallo züchtbar? **[Peragallo's Method of Cultivating Foot and Mouth Disease Virus on the Chorio-Allantois of Hens' Eggs].**—*Zbl. Bakt. I.* (*Orig.*). **143.** 273–283. 9 figs. on 2 plates, 1 table. [Numerous refs.]

R. reports an unsuccessful attempt to repeat PERAGALLO's work [*V. B.* **8.** 431.] on the cultivation of F. & M. disease virus on the chorio-allantois of the hen's egg. Material from g. pigs, of a titre of 10^{-5}, was subjected to 12 serial passages in eggs, and no virus could be detected after the third passage. The same material was successfully carried through 12 passages in g. pig embryo cultures using the method of Hecke. Virus obtained from bovines behaved in the same way as the g. pig material. Pathological changes were observed in the subcultured chorio-allantoic membranes, but these were shown to be related to the volume of material injected and the period of incubation, and to be independent of the presence of virus. Histological study of these lesions confirmed this view.—J. B. BROOKSBY.

NAIR, K. S., AYYAR, D. H., & MADHUSUDAN, A. R. (1939). **Relationship between the Degree of Reaction and Immunity in Serum Simultaneous Inoculation in Rinderpest.**—*Indian J. vet. Sci.* **9.** 385–387. 1 table.

The authors immunized young, susceptible buffalo calves by the serum-virus method, the doses of serum varying from 25–50 c.c. per 100 lb. body weight. No reaction occurred in any case where the dose of serum exceeded 35 c.c. per 100 lb. body weight. Immunity was tested by a subsequent dose of virus. They conclude that a blocked-out reaction, obtained by the use of large doses of anti-rinderpest serum when carrying out immunization by the serum-virus method, does not in any way hinder the production of immunity against rinderpest.

—J. A. GRIFFITHS.

LE ROUX, G. (1939). Étude de la valeur immunigène des plaques de Peyer chez les veaux inoculés de peste bovine. [**Immunizing Power of Peyer's Patches from Calves Affected with Rinderpest**].—*Bull. Soc. Path. exot.* **32.** 883–888.

The author carried out a series of five comparable experiments on the immunizing value of rinderpest vaccine prepared from Peyer's patches and lymph nodes of infected calves. In three experiments the Peyer's patches and underlying tissue comprising the whole thickness of the intestinal wall except the peritoneum were used, and in two experiments the lymphoid tissue was freed from the underlying tissue and used.

The latter was somewhat more effective for immunization, but the results of all the experiments showed that the immunizing power of vaccine prepared from Peyer's patches was about one-sixth that of lymph node vaccine.—J. E.

ANDRIEVSKIĬ, I. (1939). Nekotorye dannye otnositel'no immuniteta pri infektsionnoĭ anemii loshadeĭ. [**Immunity in Equine Infectious Anaemia**].—*Sovyet. Vet.* No. 8. pp. 25–28. [3 refs.]

A. infected 19 horses, which had recovered from an acute attack of the disease, with haemolysed, virulent E.I.A. blood. All but two of the horses sickened and 12 died. Following up this experiment, he subjected to a special régime 42 horses affected with E.I.A., which had had a total of 54 relapses during the preceding eight months. All horses developing temperatures were separated from the others, their stalls were disinfected and the animals were not worked until they had recovered from the relapse ; after that they were put to hard work. Under these conditions no further relapses were observed for two and a half months. At the end of this period blood from each horse was injected into two other horses of the group, and within 5–26 days relapses occurred in the case of ten horses ; and several died [number not stated].

The conclusion is drawn that most horses which have recovered from an attack of E.I.A. react to reinfection in exactly the same way as healthy horses do to a first infection. A. believes that many so-called " relapses " are in reality reinfections which can be prevented by suitable precautionary measures.—E. M.

LAKTIONOV, A. M., ARKHANGEL'SKIĬ, N. D., & KOVALEVSKIĬ, M. F. (1939). O roli zhalyashchikh nasekomykh v rasprostranenii infektsionnoĭ anemii. [**The Part Played by Biting Insects in the Spread of Equine Infectious Anaemia**].—*Sovyet. Vet.* No. 2. pp. 13–15. 2 tables.

A foal aged 8½ months was exposed to the bites of mosquitoes, tabanids and *Stomoxys* from 8 a.m. to 6 p.m. on 20 non-consecutive days, the weather being favourable to the flight of insects. Fifty metres away, ten horses with established E.I.A. were tethered, and steps were taken to avoid infection through food or contact. The foal sickened a month after the beginning of the experiment and died within a fortnight of the first appearance of symptoms, the illness being considered to be due to E.I.A. ; the P.M. examination and blood count were consistent with this diagnosis.

The authors infer that E.I.A. can be transmitted by biting insects.—E. M.

PETERKIN, G. A. G. (1937). **The Occurrence in Humans of Contagious Pustular Dermatitis of Sheep (" Orf ").**—*Brit. J. Derm.* **49.** 492–497. 3 figs. [7 refs.]

P. describes five cases of apparent infection of human beings with the virus of ovine contagious pustular dermatitis. In four cases there was direct evidence of contact with sheep affected with " orf ". The lesions occurred on the fingers or

face and were of a granulomatous nature. [No attempt was made to confirm the diagnosis by retransmitting material from human cases to susceptible sheep.]
—R. E. GLOVER.

CRUVEILHIER, L. (1939). Défense contre la rage et réglémentation en France. [**The Law Regarding the Control of Rabies in France**].—*Mouvem. sanit.* **16.** 343–354.

A discussion of the French laws which have a bearing on the control of rabies, notably a decree of October 6th, 1904. The subject is dealt with under the following headings :– dogs and cats suspected of rabies which have (a) bitten persons and (b) not bitten persons ; herbivora and swine suspected of rabies ; stray dogs ; rats ; dog collars, leads and muzzles ; dog taxes and licences, and preventive vaccination of animals.

The regulations are orthodox, but there is in France great deficiency in their execution, chiefly of those concerning dog collars and licences. Preventive vaccination is said to be a useful adjunct to control, but it would have to be made compulsory to secure real efficiency. In France the authorities prefer to use the method of legal regulations alone.—J. E.

SNYMAN, P., & THOMAS, A. D. (1938). **The Carriers of Rabies in South Africa.** —*Acta Conv. tert. trop. malar. Morbis, 1938.* Pt. 1. pp. 616–638. 11 figs., 2 tables. [19 refs.] Amsterdam : Societas Neerlandica Medicinae Tropicae. [In English].

This is a longer version of an article published elsewhere [*V. B.* **8.** 435.] and it contains illustrated descriptions of the wild animals involved in the transmission of rabies in South Africa. In the order of importance they are :– the yellow mongoose or meerkat (*Cynictis penicillata*), genet (*Genetta felina*), wild cats (*Felis ocreata* and *F. negripes*), suricat (*Suricata suricata*), small gray mongoose (*Myonax pulverulentus*) and the ground squirrel (*Geosciurus capensis*).

The yellow mongoose, suricat and ground squirrel live in burrows and are exterminated by cyanide gassing and by trapping at the sites of cases of rabies in man or animals.—J. E.

—. (1939). **Rabies in the Army—1938.**—*Vet. Bull. U.S. Army.* **33.** 133–134. 1 table.

During 1938, single-dose antirabic vaccination was carried out on 6,303 dogs, 305 cats and 12 monkeys owned by the military personnel. Only four of the animals, all dogs, subsequently contracted the disease. On the other hand, 15 unvaccinated animals (14 dogs and one cat) developed the disease, and a stray rabid dog transmitted it to a horse and a mule.—C. V. WATKINS.

DENISON, G. A., & DOWLING, J. D. (1939). **Rabies in Birmingham, Alabama. Human Mortality as Affected by Antirabies Treatments.**—*J. Amer. med. Ass.* **113.** 390–395. 4 tables, 1 graph. [5 refs.]

Veterinary interest is limited to the following data :– In 1938 there were 20,609 dogs owned by a population of one-quarter of a million persons at Birmingham, Alabama. 245 dogs were submitted for diagnosis and were found rabid. Records of the past ten years show that the animal reservoir of rabies in Alabama, and particularly in Jefferson county which contains Birmingham, has been steadily increasing and that during that decade 1,495 animals have been found rabid by laboratory diagnosis. The problem of rabies control in dogs is not discussed.
—J. E.

WEBSTER, L. T. (1939). **The Immunizing Potency of Antirabies Vaccines. A Critical Review.**—*Amer. J. Hyg.* Sect. B. **30.** 113–134. 3 tables. [Numerous refs.]

This is a review of the world literature on experimental immunity in rabies, but it is limited to properly controlled experiments such as lend themselves to statistical analysis. Details of vaccinations both after and before the test infection are included and the whole data are set out in tables which form the basis of W.'s conclusions to the effect that under research conditions vaccination has proved, with a few exceptions, to be practically valueless. In the few successful results, a minimum total of vaccine equivalent to 1% of the body weight (25–50% in odd cases) was necessary for immunization.

Single dose vaccination of dogs is discussed. UMENO and DOI (1921) and EICHHORN and LYON (1924) evidently succeeded, using a virulent vaccine, whilst SCHOENING (1925–31) and BARNES *et al* (1930 and 1934) failed to immunize dogs with a single dose of dead vaccine, either phenolized or chloroformized.

W. concludes that " the results of experiments in general are irregular and show not only relatively meagre immunizing power but little superiority of one preparation or procedure over another ". He has, therefore, begun research on fresh lines in order to produce an effective rabies vaccine—both by using a new, mouse-potency test for vaccines and by employing tissue-culture virus vaccines. [See also *V. B.* **9.** 88; **10.** 26 and 254].—J. E.

HOYT, A., & GURLEY, M. Katherine. (1937 & 1938). **Experimental Street-Virus Rabies in White Mice. Studies on Passive Immunization. I & II.**—*Proc. Soc. exp. Biol., N.Y.* **37.** 454–455, and **38.** 40–42. 2 tables. [3 refs.]

I. Mice were infected intracerebrally with street virus. Two days and one day before inoculation, 60 of the mice received intra-abdominal injections of 1 c.c. of antirabic goat or rabbit serum. The 70 control mice developed rabies and died, after an average incubation period of 10·6 days. The mice treated with rabbit antiserum were all well after three weeks, but those treated with goat serum all died, although the mean incubation period was lengthened to 14·5 days.

II. Rabbits were immunized by weekly intramuscular injections of fixed virus. Antiserum from these rabbits, injected intraperitoneally into mice, was protective against intracerebral inoculation of street virus, even when given four days after virus.

I. REMLINGER, P., & BAILLY, J. (1938). La dessiccation est-elle un facteur d'atténuation du virus rabique ? [**Desiccation as a Factor in the Attenuation of Rabies Virus**].—*C. R. Soc. Biol. Paris.* **129.** 133–134. [Reprinted in *Maroc méd.* **19.** 119–120. (1939)].

II. REMLINGER, P., & BAILLY, J. (1938). Action des hautes températures sur les virus rapidement desséchés de la maladie d'Aujeszky et de l'encéphalomyélite des equidés. [**Action of High Temperatures on the Rapidly Dried Viruses of Aujeszky's Disease and Equine Encephalomyelitis**].—*Ibid.* 460–462. 2 tables. [1 ref.] [Reprinted in *Maroc méd.* **19.** 120–121. (1939)].

I. Rabies virus in fresh, infected spinal cord has low resistance to heat. When, however, such spinal cord tissue is minced, spread in a thin layer on a glass slide, and dried over lime in the dark, the resultant material being powdered, the virus has considerable resistance to heat—2 min. at 105°C.

The authors suggest that when rabies-infected spinal cord is dried for the preparation of vaccine according to Pasteur's method, the resultant attenuation of the virus is due to tissue autolysis and not to the desiccation. They consider that

desiccation conserves the virus. They suggest that these observations indicate that the rabies agent is not a protozoan organism, but a " virulent protein ".

II. Having experimented with the effect of desiccation on rabies virus [see I], the authors have now found a similar resistance to heat in the dried viruses of Aujeszky's disease and of equine encephalomyelitis. The former withstands a temperature of 104·5°C. for 2 min., and the latter 112°C. for 10 min., the lethal temperatures for these viruses in the wet state being respectively 60°C. for 50 min. and 51°C. for 10 min.

The authors suggest that as a result of these experiments further consideration should be given to the question of the nature of these viruses.—C. V. WATKINS.

DE MONYÉ, G. A. M. (1939). De samenwerking van virus en homoloog serum bij de actieve immunisatie voor de ziekte van Carré. [**Immunization against Dog Distemper by Virus and Serum**].—*Tijdschr. Diergeneesk.* **66.** 711–715. [12 refs.] [English, French and German summaries].

The author immunized 12 dogs, 10–18 weeks old, against dog distemper by means of the serum-virus method, using Behringwerke virulent virus and immune serum. 2 c.c. of virus were given intramuscularly and 1 c.c. of serum per kg. body weight subcutaneously two days later. The immunized dogs proved later to be immune to natural and artificial infection.—JAC. JANSEN (UTRECHT).

DALLDORF, G., & DOUGLASS, Margaret. (1938). **Simultaneous Distemper and Lymphocytic Choriomeningitis in Dog Spleen and the Sparing Effect on Poliomyelitis.**—*Proc. Soc. exp. Biol., N.Y.* **39.** 294–297. 2 tables. [4 refs.]

The authors found that in distemper studies on monkeys the distemper virus which they were using also contained the virus of lymphocytic choriomeningitis. They conducted experiments to show that the latter virus occurs in dogs, and to rectify their earlier work [*V. B.* **8.** 508.] on canine distemper in the monkey and the sparing effect of distemper on experimental poliomyelitis.

Dogs were infected with distemper, and a suspension of their pooled spleens was inoculated intracerebrally into mice. The clinical response of the mice resembled that of lymphocytic choriomeningitis. Experiments were also conducted with rabbits, g. pigs, puppies and rhesus monkeys, with similar results, and it was found that animals which sickened after injections of infective material but recovered, were resistant to lymphocytic choriomeningitis virus.

Experiments were then made which showed that lymphocytic choriomeningitis virus alone does have a sparing effect on experimental poliomyelitis.—D. D. O.

I. BURNET, F. M., & WILLIAMS, S. W. (1939). **Herpes Simplex : A New Point of View.**—*Med. J. Aust.* April 29th. 637–642. 1 fig., 3 tables. [12 refs.]

II. BURNET, F. M., LUSH, Dora, & JACKSON, A. V. (1939). **The Propagation of Herpes, B. and Pseudorabies Viruses on the Chorioallantois.**—*Aust. J. exp. Biol. med. Sci.* **17.** 35–40. 1 fig., 3 tables. [6 refs.]

III. BURNET, F. M., LUSH, Dora, & JACKSON, A. V. (1939). **The Relationship of Herpes and B. Viruses : Immunological and Epidemiological Considerations.**—*Ibid.* 41–51. 1 fig., 7 tables. [13 refs.]

I. Herpes simplex in the human subject has for some time been of special interest because it provides an example of a virus infection which persists throughout life. Recently DODD, JOHNSTON and BADDINGH have shown that the initial infection always occurred in early childhood in the form of aphthous stomatitis. The authors have confirmed and extended this observation. If an individual

becomes infected in early childhood, antibodies are developed and these together with the virus and a liability to recurrent attacks of herpes simplex are carried for life. If not infected in early childhood, the individual develops an age resistance and no antibodies.

From the biological point of view herpes simplex can be regarded as a very successful adaptation of the virus to ensure its indefinite survival. The disease is quite harmless to the host.

" Yet a situation in which about 90% of the largest group in the community are providing harbour for the virus must be regarded as an extraordinary biological success for any parasite. As far as we know at present, no other virus has established this type of almost symbiotic existence in man; but it is of great interest that two viruses which are clearly related to herpes virus have developed a similar relationship with two other mammalian species. In the middle west of America swine are almost universally infected with the virus of pseudo-rabies [Aujeszky's disease], without in most instances any visible symptoms of infection (Shope). This virus produces nuclear inclusions of the herpes type, and there is an essential similarity of the lesions it produces in the rabbit to those of herpes. The common Indian monkey (*Macacus rhesus*) is also very frequently infected, without symptoms, by a virus that is even more closely related to herpes than is the pseudo-rabies virus. This *B* virus, although most innocuous for monkeys, is highly pathogenic for man (Sabin and Wright), and has been responsible for the death of a distinguished American research worker, and in all probability for that of a king of Greece. Both died after being bitten by apparently normal monkeys."

II. Herpes, " B " virus and the virus of Aujeszky's disease grow on the chorio-allantois of the developing chick embryo and produce foci which enable serum-virus titrations to be carried out. The three viruses produce rather similar lesions on the chorio-allantois, and similar intranuclear inclusions develop. With continued passage, herpes becomes more pathogenic for the embryo and slightly less virulent for small mammals used as experimental test subjects. Aujeszky's disease virus becomes somewhat less pathogenic for mice and rabbits after egg-membrane passage.

III. The authors, in collaboration with Hurst, studied sera of normal monkeys for antibody against " B " virus and found that quite a number contained demonstrable amounts. These positive sera also inactivated herpes virus. Inoculation of monkeys with " B " virus resulted in production of antibody which was more active against herpes than against " B " virus. Human sera which contain herpes antibody also show some degree of inactivation of " B " virus.

The epidemiology of " B " virus, herpes and pseudorabies is discussed, and the three viruses are considered to be related both from the epidemiological and immunological points of view.—W. I. B. Beveridge.

I. Frauchiger, E., & Hofmann, W. (1938). Experimentelle Poliomyelitis-Uebertragungen auf Rinder. [**Experimental Conveyance of Poliomyelitis to Oxen**].—*Schweiz. med. Wschr.* **68.** 1140. [1 ref.] [See also *V. B.* **9.** 244].

II. Frauchiger, E., & Messerli, W. (1938). Weitere Fälle von spontaner Poliomyelitis beim Haustier (Schwein). [**Further Cases of Spontaneous Poliomyelitis in Animals (Pigs)**].—*Ibid.* **69.** 74–76. 2 figs.

III. Frauchiger, E., & Messerli, W. (1939). Poliomyelitis auch bei Schweinen. [**Poliomyelitis in Pigs**].—*Schweiz. Arch. Tierheilk.* **81.** 207–212. 2 figs.

I. Intranasal, intraperitoneal, and intraspinal injections of an emulsion of human brain and spinal cord from patients who had suffered from poliomyelitis, led in oxen to transitory paresis of the limbs, altered gait, atrophy of the gluteal muscles and alterations in the cerebrospinal fluid. This is a preliminary report; the results of attempted retransmissions and of histological examinations of the

central nervous system of the oxen affected were not available when the article was published.

II. Two ten-month old pigs living in contact developed progressive paralysis within a few days of each other and were killed on account of the paralysis. Their central nervous systems were removed and examined histologically; the findings are described and are illustrated in two figures. The slight inflammatory changes resembled those of acute anterior poliomyelitis in man.

Transmission experiments on two pigs by lumbar spinal injection of nerve tissue gave negative results, but a similar test on a bull resulted in transient fever and general signs of spinal injury, which was reflected in the result of examination of the cerebrospinal fluid. Recovery occurred after seven days' illness.

[F.'s observations do not provide proof of the existence of the virus of human poliomyelitis in animals.]

III. Identical with II.—J. E.

IYER, S. G. (1939). **On the Successful Transmission of Variola in Goats [Goat Pox] in a Generalized Form.**—*Indian J. vet. Sci.* **9.** 383–384. 2 figs. on 1 plate. [1 ref.]

This paper records the experimental reproduction in a generalized form of goat pox by the subcutaneous inoculation of blood taken at the height of the initial febrile reaction or by the use of an emulsion of spleen pulp taken P.M. The true syndrome of variola was reproduced. Vesiculo-pustular lesions were a prominent feature on the abdomen and inner sides of the thighs in two goats, while in two others the lesions were more prominent within and outside the mouth. In cases inoculated by scarification of the skin only, with virus obtained from skin lesions, there was a local reaction at the site of inoculation but no generalization. Where skin lesions are not available for a diagnosis by animal inoculation as may be the case when kids are affected, the spleen from a suspected case may be used as seed material; the spleen may be preserved for this purpose in 50% glycerinated saline.—J. A. GRIFFITHS.

LEVADITI, C., REINIÉ, L., STAMATIN, LE-VAN-SEN, & BEQUIGNON, R. (1940). Ultravirus et fluorescence. Le virus vaccinal. (Premier mémoire). **[Ultravirus and Fluorescence. Vaccinia Virus. Part I].**—*Ann. Inst. Pasteur.* **64.** 359–414. 13 figs., 9 tables, 17 diagrams. [Numerous refs.]

In this article L. and his collaborators have summarized the evidence on the significance of fluorescent bodies in purified suspensions of vaccine virus. The majority of the experiments have already been abstracted [*V. B.* **9.** 852; **10.** 94 and 589.], but a few fresh observations are recorded in this article.

It was found that the addition of thioflavine to vaccine suspensions considerably aids the recognition of elementary bodies by microscopic examination. These corpuscles are not alike, but form a heterogenous suspension. It can be shown, for example, that some are virulent while others are inert; in addition, differences in size can be detected by ultrafiltration and by high speed centrifugation. Nevertheless, a histological examination of infected tissues, *e.g.*, cornea, allantoic membrane, shows that generally speaking the intensity of the reaction is directly proportional to the number of E.B. inoculated. Below a certain level of active elements, lesions invisible to the naked eye are produced which are readily revealed microscopically. It is also suggested that E.B. may show qualitative variations. For example, a much larger number of dermovaccine bodies is needed to produce an encephalitis in the rabbit than when neurovaccine is used.—R. E. GLOVER.

BEDSON, S. P. (1938). **A Study of Experimental Immunity to the Virus of Psittacosis in the Mouse, with Special Reference to Persistence of Infection.**—*Brit. J. exp. Path.* **19.** 353–366. 10 tables. [15 refs.]

A considerable degree of immunity to psittacosis in mice was produced by the injection of a vaccine which consisted of virulent mouse spleen emulsion, inactivated by the addition of 0·1% formalin and storage in the refrigerator for 10-14 days before use. No living virus was demonstrable in such a vaccine. The possibility of setting up a good and durable immunity by completely inactivated psittacosis virus, as in certain other virus diseases, has been proved experimentally; however, immunity following recovery from live-virus infection is more solid. Immunization of mice was carried out by three intraperitoneal injections of 0·3 c.c. of the formolized vaccine at weekly intervals. The immunity was tested with live virus 10 days after the last dose of vaccine. Up to 109 days after vaccination, the test period, there was evidence of immunity in the vaccinated mice, but it is stated that the immunity was not complete. After the test dose of live virus into the vaccinated mice, although no obvious symptom of infection was shown, the injected virus multiplied, but not sufficiently to produce a true infection such as would occur in unvaccinated animals. When once established in immune mice, the virus persists without causing any symptoms for a considerable time in the life of the mouse.

The presence was recorded of circulating specific antibody in actively immunized mice, and there were several detailed observations on the immunizing value of a mixture of immune serum and virus left standing for two hours at room temperature, and of the persistence of infection in animals after injection with this mixture. Serial passage of the virus in immune mice did not produce any appreciable change in virulence.—S. G. IYER.

I. MEYER, K. F., & EDDIE, B. (1939). **The Value of the Complement Fixation Test in the Diagnosis of Psittacosis.**—*J. infect. Dis.* **65.** 225–233. 6 tables, 1 chart. [7 refs.]

II. MEYER, K. F., & EDDIE, B. (1939). **Psittacosis in Importations of Psittacine Birds from the South American and Australian Continents.**—*Ibid.* 234–241. 4 tables. [6 refs.]

I. This is primarily a confirmation of BEDSON's work [*V. B.* **6.** 439]. The results show that the c.-f. test is helpful for early as well as for late diagnosis of psittacosis in man. With the object of improving the existing method of antigen preparation, experiments were carried out with different antigens. Better results were obtained with one prepared from cultures of the virus in Rivers-Li medium, than with virulent mouse-spleen suspension; in either case, the heated antigen (boiled) was far superior to the crude, unheated one, which is unstable and is dangerous for the user [*V. B.* **6.** 810]. Sera from cases of human psittacosis were examined by the test, and evidence was obtained that the antibodies persisted in the serum of some patients for a considerable time after infection; presumably such persons might remain virus carriers. In fact, the serum of one patient yielded c.-f. reactions 38 months after infection. Cases in which psittacosis was suspected have been diagnosed by the c.-f. test with considerable certainty as early as 6–11 days after infection, when clinical diagnosis was uncertain. Positive c.-f. reactions were obtained with serum of patients with other diseases but in low dilutions. This finding substantiates the previous observation of BEDSON, that positive Wassermann sera may occasionally give positive reactions.

The possibility is discussed of the existence of latent infections in persons who have had close contact with the virus.

The authors, while recommending treatment with immune serum, point out that the administration of convalescent serum to a patient has given beneficial results. A high-titred serum has been prepared by hyperimmunization of goats.

II. It is suggested that psittacosis infection in human beings is, in all probability, traceable as a rule to parrots released after the usual two weeks' quarantine of imported birds. The suggestion is made that, to safeguard the country from the perpetual danger of this disease, the present period of observation and quarantine of such birds at the ports should be prolonged.

A brief description is given of the history of three shipments of psittacine birds in which exhaustive investigations involving the destruction of entire shipments were made, and the existence of the infection, in either acute or "inapparent" forms, was confirmed. The inoculation tests were occasionally complicated by the presence of *Salmonella typhi-murium* in the tissues of the birds [see *V. B.* **4.** 736]. The measurements of the spleen from a large number of birds are given.

The value of the c.-f. test in detecting the existence of psittacosis in imported birds is emphasized ; it is particularly helpful where the infection is not ordinarily demonstrable by other means. Tissue-culture antigen [see *V. B.* **10.** 272.] has been used to advantage in the c.-f. tests, in preference to the crude antigen, prepared from virulent mouse-spleen pulp. The apparent immunological identity of the different strains is discussed.—S. G. Iyer.

PARASITES IN RELATION TO DISEASE [GENERAL]

Kotlán, S. (1936). A gyakoribb és kórtani nézőpontbol fontosabb állati élősködők mai nomenclaturája. **[Nomenclature of the Important Animal Parasites].** —*Állatorv. Lapok.* **59.** 134–136 and 149–150.

This article consists largely of a list of synonyms.—E. Martin.

China. (1939). **Report of Work on Parasitology at Henry Lester Institute of Medical Research, Shanghai. 1937-38.** [Robertson, R. C.]—*Rep. Lester Inst. med. Res. 1937–38.* pp. 46–55 and 84. 1 table. [18 refs.]

Special work was carried out on the coccidia of dogs. A kitten was infected with dog coccidia. *Eimeria canis* (not previously found in China) was demonstrated in a dog.

Out of 355 sheep and 198 goats examined, six of the sheep and 16 of the goats were found to be infected with *Schistosoma japonicum.* Hexylresorcinol was satisfactory in the treatment of pigs experimentally infected with *Fasciolopsis.*

In a survey made in the abattoirs of the Shanghai Municipal Council Public Health Department, all cattle were free from trichinosis, and cysticercosis was practically absent.

Results of a helminth survey of the lower animals are recorded in tabular form. A few of the parasites found constitute new species.

Results are given of the examination of the faeces of dogs for *Schistosoma* and other worm eggs.—F. T. Boyle.

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

Husain, M. A. (1939). **Entomology in India : Past, Present and Future.**—*Proc. 25th Indian Sci. Congr., 1938.* Pt. 2. pp. 201–246. 2 tables. [Numerous refs.] Calcutta : Royal Asiatic Society of Bengal.

This is the first appearance of a section of entomology at the Indian Science Congress. In introducing the section, H. gave an interesting account of

the history of entomology in ancient and modern India, including advances in medical and veterinary science.

After emphasizing the importance of insect control in a tropical country such as India, he discoursed at length on the inadequacy of the present organization of entomology in India, including library facilities, teaching staff, identification service and practical application to disease problems. The estimated annual monetary loss in domesticated animals from insect pests in India exceeded Rs. 380,00,000, and of this sum, the ox warble fly alone was responsible for Rs. 150,00,000. To cope with this and similar losses in every branch of medicine and agriculture there was only one entomologist to every two and a half millions of population, and the total amount spent on entomological work did not exceed Rs. 15,00,000.

H. recalled many resolutions brought up in previous years before various official bodies, but on which very little action had been taken. He made a plea to the new section to press for more effective action, and to encourage the study of entomology by every means in its power.—E. S.

THORSHAUG, K. (1940). " Sjodogg " tick borne fever hos sau i Norge. [**Tick-Borne Fever in Sheep in Norway**].—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 324–336. 2 tables, 2 graphs. [5 refs.] [English summary].

The report of an investigation into a disease of sheep in western Norway, which was eventually found to be transmitted by *Ixodes ricinus* and to be apparently identical with tick-borne fever in Scotland [see *V. B.* **7.** 527].—J. E.

LEWIS, E. A. (1939). **The Ticks of East Africa. Pt. I. Species, Distribution, Influence of Climate, Habits and Life-Histories.**—*Emp. J. exp. Agric.* **7.** 261–270. [For part II, see *V. B.* **10.** 427].

In East Africa ticks provide one of the most serious problems of stock raising. Because of the diseases they transmit they have hindered the development of native reserves and agriculture by impeding the improvement of indigenous stock. The free movement of cattle has also been restricted because of tick-borne diseases. Seventy-four species of ticks have been collected and recorded in East Africa, 44 species being found in Uganda, 47 in Tanganyika Territory and 58 in Kenya Colony. The 74 species belong to the following 12 genera :- 10 *Ixodes*, 7 *Haemaphysalis*, 2 *Dermacentor*, 20 *Rhipicephalus*, 7 *Hyalomma*, 1 *Hyalommina*, 1 *Boophilus*, 2 *Aponomma*, 15 *Amblyomma*, 4 *Ornithodoros*, 3 *Argas* and 1 *Margaropus*. At least 18 of these species have been incriminated in the transmission of disease. The life-history of 34 species appears to be known, while the others have not been fully described.

A short description is given of the geographical distribution of ticks, the climate of East Africa and its effect on ticks, and the habits and life-histories of certain species. Much more work requires to be done in order to assist the administration in drawing up programmes for tick eradication. Some farms surrounded by tick-infested country, have been rendered tick free by efficient control measures.—WALTER MOORE.

YAMASHITA, J. (1939). **Studies on Ticks found in Manchoukuo. I. On Two Species of Tick from Cattle at the Yamuyingtzu Stock-Farm, near Wangyehmiao, Inner Mongolia, Manchoukuo.**—*Jap. J. vet. Sci.* **1.** 602–609. 14 figs. on 2 plates. [12 refs.] [In Japanese : abst from English summary].

Piroplasmosis of cattle is very common in Manchukuo, but the vector of the disease has not been recorded. Y., in search for possible vectors, found two species

of ticks, *Dermacentor reticulatus* and *Hyalomma detritum albipictum* on 105 out of 324 cattle examined, chiefly on the dewlap and inner sides of the hind legs. The plates illustrate the external characters of the two species.—WALTER MOORE.

BERNADSKAYA, Z. M. (1938). Izuchenie biologii kleshcheĭ Hyalomma v usloviyakh peschanoĭ pustyni. [**The Biology of *Hyalomma* under Sandy Desert Conditions**].—*Trud. Uzbek. nauchn.-issled. vet. Stan. Tashkent.* **10.** 18–35. 2 figs., 12 tables. [Numerous refs.] [English summary].

A description is given of the climatic and soil conditions in the Karakul desert region of Western Uzbekistan, its tick fauna, the biology and behaviour of these ticks and the specific control measures indicated in the circumstances. *H. asiaticum* and *H. turkmeniense* are common ; *H. savignyi* and *Rhipicephalis turanicus* occur, but not frequently. Only the adults attack domestic animals, while the immature stages feed on wild rodents only. Tick activity is entirely limited to early morning, late evening and night, as the high day temperatures quickly destroy the ticks and compel them to shelter from the sun in the burrows of rodents or under plants. May is the peak month for the adults, with a sudden fall in June and a minor peak in September ; immature stages abound in June.

As *H. asiaticum* constitutes three-quarters or more of the ticks in this region, the following account of its life-cycle is given :– Detachment from the host to oviposition, 8 days ; development of eggs, about 30 days ; hatching to attachment of larvae, 5–6 days ; gorging of larvae, 3 days ; moult of larvae, 8–12 days, moult to attachment of nymphs, 6–10 days ; gorging of nymphs 5–6 days ; moult of nymphs, 15–21 days ; moult to attachment of adults, 5–6 days ; gorging of adults, 7–9 days ; average total cycle, 92–111 days.

Pasture rotation and the destruction of the ticks by dipping are recommended as measures of control.

PARASITES IN RELATION TO DISEASE [HELMINTHS]

YOUNG, May R. (1939). **Helminth Parasites of Australia. A Bibliography with Alphabetical Lists of Authors, Hosts and Parasites.** pp. 145. St. Albans, England : Imperial Bureau of Agricultural Parasitology (Helminthology). [4to] [10s. 6d.]

This work may be regarded as an attempt to index all the reports ever published regarding helminth parasites in Australia. The first section consists of the bibliography and contains 947 references from 118 recognized scientific periodicals, plus 39 references from non-periodical literature. A simplified author index, alphabetically arranged, concludes this section. The next section of the book contains the host lists, under such host classes as mammalia, aves, mollusca, insecta, crustacea and plants. The last 55 pages are devoted to the parasite list. Trematodes, cestodes, nematodes and acanthocephalans are set out with the Latin name of the host and the locality in which the parasite was recorded. The book will be invaluable to anyone wishing to trace any literature dealing with helminths in Australia.—A. L. WILSON.

ROBERTSON, D. (1937). **The Parasitic Helminths of Sheep in Scotland.**—*XIIe Congr. int. Zool. Lisbonne, 1935.* **3.** 2013–2043. 4 figs. on 1 plate, 10 tables. [5 refs.] [In English].

R. gave the results of a survey, which he began in 1933, of the helminth infestation of Scottish sheep.

He began by circulating a questionnaire to 1,603 sheep breeders throughout Scotland. Of the 572 who replied, 310 (54 %) reported losses from suspected worm infestation. Of this latter group 75 % were using anthelmintics, mainly patent remedies, and usually without much success. Others were altering or improving their methods of husbandry in attempts to check their losses.

R. next visited 61 farms which had reported losses, with the object of finding out the extent of infestation and the species involved. In this connexion, he autopsied 33 lambs up to nine months old and made worm counts. The species found most frequently were *Trichostrongylus vitrinus*, *Ostertagia trifurcatus*, *O. circumcincta* and *Nematodirus* spp., the two latter being found in the greatest numbers (up to 17,000 of *O.c.*). *Fasciola hepatica* was not seen, and only small numbers of *Moniezia*, in lambs. Symptoms of " sturdy " or " gid " (*Coenurus*) were seen in sheep on ten farms, and liver fluke was present in sheep of five hill flocks.

Finally, large numbers of fat lambs and sheep were examined at an Aberdeen abattoir. Hydatid cysts were found in five out of 500 sheep. *O. ostertagia* was recovered for the first time from sheep in Scotland. No cases of haemonchosis were observed, but pathogenic infestations with *Chabertia ovina* and *Trichuris ovis* were found.—E. S.

THAPAR, G. S. (1937). **Helminthological Research in India.**—*Proc. 24th Indian Sci. Congr., 1937.* pp. 275–290. 2 figs. [Numerous refs.] Calcutta : Royal Asiatic Society of Bengal.

T. emphasized the growing significance of helminthology in medical and veterinary work in India at the present time. He pointed out the danger of increased worm infestation of domestic stock from crowding, as more and more grazing land is taken over for farming or human habitation. Modern rapid transport of animals may bring about infection of new areas.

He criticized the teaching of helminthology as carried out in Indian laboratories and universities, especially the reliance on out-of-date general zoology texts, whose errors in life-history accounts and nomenclature may lead to incorrect or confused diagnosis. He recommended also that common animal parasites should be used instead of human ones in instructing zoology and veterinary students.

He commended the systematic work, on the trematodes especially, already done in India, and urged its continuance. He suggested careful testing of all native drugs and remedies, to determine the active principle involved, and their value, if any, as anthelmintics.

Finally, he urged the need for joint research schemes, involving co-operative work by zoologists and by medical and veterinary practitioners, in order to achieve more rapid and effective progress in what promises to be a most important field of research in India.—E. S.

SANT'ANNA, J. F. (1937). Quelques considérations sur le parasitisme chez les vers. [**Some Considerations on Parasitism in Helminths**].—*XII Congr. int. Zool. Lisbonne, 1935.* **3.** 2045–2056. [In French].

S. elaborated his ideas on the adaptation of worms to the parasitic mode of life. His hypotheses of the early evolutionary history of some types were somewhat involved and, in attempting to substantiate them, he was compelled to put forward some rather unusual ideas, not the least interesting being that the trichinae were once parasites of insects. [This paper makes little or no contribution to our knowledge of the probable evolution of parasitism.]—E. S.

PORTER, Annie. (1938). **The Larval Trematoda Found in Certain South African Mollusca with Special Reference to Schistosomiasis (Bilharzia).**—*Publ. S. Afr. Inst. med. Res.* No. 42. pp. 492. 1 text-fig., 83 plates, 1 map. [Numerous refs.] Johannesburg: The South African Institute for Medical Research. [4to].

This excellent monograph is concerned mainly with the trematodes themselves in relation to their molluscan hosts, and with their actual or possible importance in human medicine. There are, however, full descriptions of all the larval stages of two cattle schistosomes, *S. spindale* and *S. bovis*, together with an account of their snail hosts and geographical distribution. There are also descriptions of the developmental stages of *Fasciola gigantica*, a liver fluke of African cattle, sheep, goats and antelopes, and an interesting discussion of its relationships with *F. hepatica*, the common liver fluke of sheep, which also occurs in Africa. *Lymnaea natalensis* and *Bulinus tropicus* are the chief hosts of these species in Africa, although *L. truncatula* does occur and serves as host for *F. hepatica*.

As a general rule, P. found that young animals were more susceptible to experimental infection than older ones. South African trematodes show closer natural affinities with those of India than with those of Europe, a fact which is correlated with the closer relationship of African and Indian snails.—E. S.

SRIVASTAVA, H. D. (1939). **A Study of the Life-History of a Common Tapeworm, *Mesocestoides lineatus*, of Indian Dogs and Cats.**—*Indian J. vet. Sci.* **9.** 187–190. [14 refs.]

S. describes numerous encysted tetrathyridia [recognized to be the larvae of *Mesocestoides* spp.] found in the serous coat and liver of nearly all specimens of a non-poisonous snake, *Tropidonotus platyceps*, which he examined. When two parasite-free jackal cubs were fed these larvae, both died within 17 days and were found to be heavily infested with adult *M. lineatus*. Twelve specimens of the common Himalayan viper, *Ancistrodon himalayanum*, were found free of tetrathyridia. Lizards and rats harboured larvae similar to the snake species, but much larger. No feeding tests are described. An attempt to discover a primary larval stage, by feeding mature eggs containing active onchospheres to white mice and cockroaches, was not successful.—C. V. WATKINS.

RAO, M. A. N. (1939). **On a Species of *Joyeuxia*, Lopez-Neyra, 1927, from a Cat (*Felis catus domestica*).**—*Indian J. vet. Sci.* **9.** 377–378. 1 text-fig., 2 figs. on 1 plate. [4 refs.]

R. records for the first time in South India the finding of two specimens of the cestode genus *Joyeuxiella* from a cat. In view of the morphological findings the author considers this worm to be *J. chyseri* (v. Ratz 1897). [The generic name *Joyeuxia* cannot be used here, being already occupied by a genus of sponges (Neveu-Lemaire, 1937.)]—M. L. BINGHAM.

ROMAN, E. (1939). Biologie d'*Ascaris lumbricoides* jeune; infestation pulmonaire de rongeurs; réinfestation de l'homme parasité. [**Biology of Immature *A. lumbricoides*; Pulmonary Infestation of Rodents and Reinfestation of Human Beings**].—*C. R. Soc. Biol. Paris.* **130.** 1168–1170.

A g. pig, ten white mice and three field mice were fed with cultures of *A.l.* eggs, derived from human faeces. Nine days later the lungs of two of the field mice showed numerous larvae and extensive haemorrhages, whilst four mice and the g. pig showed a lighter infection, thus illustrating the susceptibility of mice to *A.l.* Further observations confirm that, as is also the case in ascaris infection in

the pig, human beings may harbour adult *A.l.*, and at the same time may become reinfected with eggs of the same species. Immature as well as adult *A.l.* were recovered from a human being after anthelmintic treatment; the former represented a parasitic existence of about four weeks.—M. L. BINGHAM.

FENWICK, D. W. (1939). **Some Experiments on the Extra-Corporeal Hatching of the Eggs of** *Ascaris suum*.—*J. Helminth.* **17.** 69–82. [13 refs.]

F. confirmed Macrae's observation that hatching of eggs when shaken in damp sand may be due to mechanical injury to the egg shell. He carried out experiments to test the influence on hatching of inorganic salts, alkali, varying temperature, osmotic pressure, and pH. Temperature and osmotic pressure appeared to have no effect. A saline solution of pH 7·4 had a slight effect, but increases in either pH or alkali were in themselves incapable of causing hatching.

The work of LAPAGE [*V. B.* **6.** 818.] upon the ecdysis of Trichostrongylid larvae in "Milton" is analysed. F. found that both the sulphide and hypochlorite of sodium induce hatching, probably through shell adsorption of S and ClO ions, respectively. Natural hatching may, therefore, be a physico-chemical reaction, resulting in greater permeability and solubility of the shell in alkali, and leading to its rupture because of increased internal osmotic pressure. The ions, not necessarily S or ClO in nature, may be produced by bacterial action or by the larvae themselves.

Further lines of investigation relating to the adsorption of S ions are outlined.
—C. V. WATKINS.

ACKERT, J. E., WHITLOCK, J. H., & FREEMAN, A. E., Jr. (1940). **The Food of the Fowl Nematode,** *Ascaridia lineata* **(Schneider).**—*J. Parasit.* **26.** 17–32. 1 fig., 3 tables. [Numerous refs.]

The authors consider that the presence of solid particles in the host ingesta stimulates the worms to feed and that the absence of food in the intestinal tract of fowls is detrimental to the parasites.

The various factors which may be harmful to the worm are discussed. Experiments were conducted to compare the viability and growth of *A.l.* from chickens fed a normal ration, with the worms from chickens which were allowed only water *per os* and given nutrient parenteral injections; preparations of egg yolk, normal fowl serum and glucose were tried. The results indicated that the young *A.l.* made no appreciable growth in the intestines of chickens which were deprived of the usual ration, whereas in chickens which were fed normally the worms continued to grow.

It is believed that the rate of elimination of *A.l.* from chickens tends to increase after about the 19th day of infestation. In an experiment in which chickens were parasitized at the age of one month and were either fed normally or deprived of the normal ration, it was evident that the host ingesta formed the principal part of the food of *A.l.*

The flow of the bile in chickens was diverted—by surgical interference—from that portion of the small intestine which the worms inhabit; little variation was noted in either the number or size of the worms in the small intestine of these chickens and it is inferred that bile has no influence upon the worms.—S. G. IYER.

DE JESUS, Z., & UICHANCO, J. B. (1939). **The Incidence of Intestinal Parasitism on Philippine Horses with Special Reference to Strongylosis.**—*Philipp. J. anim. Indust.* **6.** 435–447. 3 plates, 5 tables. [16 refs.]

The paper is based on the results obtained from faecal examination of 428

horses of various breeds and types and ranging in age from a few months to 12 years. 95% of the horses were found to be infested, 93·2% with *Strongylus*, 29·6% with *Trichonema*, 16% with *Ascaris equorum*, 8·2% with *Oxyuris equi* and 1·4% with *Anaplocephala perfoliata*. The incidence of *Habronema* was not determined.

Among the horses which were infested by a single helminth species, 49% harboured species of *Strongylus* while only 0·7% harboured *A. equorum*. 95% of horses aged from a few months to 2 years were parasitized, as were 95% of horses between 3 and 7 years and 98% of horses between 8 and 12 years. Strongylosis in horses 1–2 years old could be fatal even though the animals were receiving proper attention and good food. Young horses heavily infested with species of *Strongylus* developed an oedema over the ventral surface of the body, which might lead to suspicion that the animal was infected with surra.—A. L. Wilson

Lichtenstern, G. (1938). Klinik und Therapie der Strongylose der Pferde. **[Symptoms and Therapy of Strongylosis in Horses].**—*Dtsch. tierärztl. Wschr.* **46.** 787-789.

It is suggested that the anaemia is caused by loss of blood, probably due to haemolytic excretions of the parasite. L. discusses treatment of affected animals and claims that an intravenous injection of oil of turpentine gives good results, and that *Anoplocephala plicata* is also expelled. L. also recommends intravenous injection of a mixture containing 1 part hexachlorethane to 10 parts ol. terebinthinae, together with bovine bile *per os*. As some symptoms in strongylosis resemble haemorrhagic diathesis, and the liver seems regularly affected, a lack of vitamin K may be one of the pathogenic factors in severe cases.

—V. Chládek (Prague).

I. Whitlock, J. H., & Leasure, E. E. (1939). **Studies upon** *Strongylus vulgaris*. **I. The Incidence of** *Strongylus vulgaris* **in Mid-Continental North America and the Reaction of the Infested Ceca.**—*Amer. J. Hyg.* Sect. D. **29.** 83–87. 2 tables. [6 refs.]

II. Whitlock, J. H. (1939). **Studies upon** *Strongylus vulgaris*. **II. Initial Development of Apparatus Adapted for the Study of** *Strongylus vulgaris* **in vitro.**—*Ibid.* **30.** 1–3. 1 fig. [5 refs.]

III. Whitlock, J. H., Link, R. P., & Leasure, E. E. (1939). **Studies upon** *Strongylus vulgaris*. **III. The Influence of Hydrogen-Ion Concentration upon the Longevity of** *Strongylus vulgaris* **in vitro.**—*Ibid.* 5–14. 6 tables. [7 refs.]

I. In a series of observations made on 174 horses at a meat packing establishment, 84% were found to be infested by *S. vulgaris* in the caecum. Three degrees of infestation were recognized :– (1) light ; under 100 parasites, (2) moderate ; over 100 parasites but not a heavy infestation and (3) heavy ; an infestation of the last 15 cm. of the caecum in which not 1 sq. cm. was free from parasites.

The high incidence of *S. vulgaris* and the low incidence of the smaller strongyles in a group of aged horses tend to confirm the observations of Foster [*V. B.* **8.** 373.] that there is no age resistance to this parasite.

The average pH of the caeca of all infested animals was 7·24, compared with 7·08 for non-infested animals. Although there was no correlation between the pH range of the caeca and the numbers of parasites present, there was a direct correlation between the mean pH and the degree of infestation found in the host. There was appreciable difference in mean pH between animals with no infestation and those with a light, moderate or heavy infestation, but there was no difference between the mean pH in the various degrees of infestation.

II. This paper contains a description of the culture dish devised by W. for the study of the parasite *in vitro*. It is made of pyrex glass and has a large, open, front end to facilitate manipulation of the parasite inside. There is a lip at the bottom of this end, placed in such a way that liquefied solid media can be poured in. The other end of the dish has a narrow tubular opening which acts as a drain. Fresh medium is dropped into the dish at the front end by a gravity apparatus and, since it is simultaneously escaping at the other end, the medium is constantly changing. A description of the additional apparatus required and the methods of its use are also given.

III. The third paper describes experiments carried out to study the effects of various solutions on the life of *S. vulgaris*. The optimum pH range for the parasite, *in vitro*, is between 6·5 and 8, which agrees with the pH range *in vivo*. An acid solution (pH 4–pH 5·5) kills the parasites in four hours. The male parasite is much less resistant to an unfavourable environment than the female.
—A. L. Wilson.

Cameron, H. S., & Stewart, M. A. (1939). **Studies on the Course of Trichostrongyle Infestation in Sheep.**—*J. Amer. vet. med. Ass.* **95.** 177–180. 2 figs. [3 refs.]

Two age groups of lambs, 1–4 weeks and one year, were used in the experiments. Sixteen lambs in the first group each received 1,000 larvae, these being a mixture of *Ostertagia circumcincta* and *Trichostrongylus colubriformis*. Two other lambs in this group each received 500 of the mixed larvae. In the second group, five animals each received 1,000 *T.c.*, and three others 1,000 *O.c.* larvae.

The results showed that susceptibility or resistance to trichostrongyle infestation could be clearly demonstrated at the age of one week, as well as later. The egg count varied daily in untreated animals, and the duration of oviposition was at least one year.—A. L. Wilson.

Machioni, I. (1939). Su di un frequente reperto di infestione miliare da larve di strongilidi nel fegato degli ovini. **[Miliary Strongyle Larval Infestation in the Liver of Sheep].**—*Nuova Vet.* **17.** 315–322. 9 figs.

M. describes miliary nodules due to the presence of nematode larvae, frequently found in the livers of sheep in the locality of Pisa. These nodules are situated under the liver capsule, and throughout the parenchyma. During the early stages of their development they are fibrous in structure, but later they become calcified. Microscopic details of their cellular structure are given. At the centre of each nodule is a strongyle larva, closely resembling that of *Dictyocaulus filaria*, but differing from this in being of slightly larger size, having a more definite bulbous oesophagus, and showing some sexual differentiation. M. considers these differences to be due only to maturation of the larvae whilst in the liver. As in every case the infected livers were from sheep affected with verminous bronchopneumonia, he assumes that the larvae are those of *D. filaria*, arrested in the liver during their passage from the intestine to the lungs.—K. Sanderson.

Boev, S. N. (1937). Sintetokaulyusy legkikh ovets Alma-Atinskoĭ oblasti Kazakhstana. **[The Nematodes of the Genus *Synthetocaulus* Parasitic in Sheep of Alma-Ata Territory, Kasakhstan].**—*Papers on Helminthology, commemorating* 30 *year Jubilee of K. I. Skryabin.* pp. 55–62. 6 figs., 2 tables. [3 refs.] Moscow: Lenin Acad. Agric. Sci.

Examining material from 56 lungworm-infested sheep from various districts

of Kazakhstan, B. found, in addition to *Dictyocaulus filaria*, *Synthetocaulus raillieti* and *S. hobmaieri*, a new species of *Synthetocaulus* which he named *S. skrjabini*. —E. MARTIN.

POU, M. C., VIERA, O., CALZADA, V., & GARCÍA, J. A. R. (1938). Primera comprobación de microfilarias del perro en el Uruguay. [**Microfilariasis of Dogs in Uruguay**].—*An. Fac. Vet., Montevideo.* No. 4. pp. 355–358. 4 figs. [2 refs.]

A microfilaria was accidentally discovered in the peripheral blood of a dog, one or two per preparation being found, the size being 230–250μ by 3·8–4·0μ. Fifty other dogs were examined and four were found to be infected, all being dirty and undernourished. Examination of fleas (*Ctenocephalus canis*) as possible carriers proved negative. The larvae were morphologically identical with those described by ANTEGUEDA (1930) from dogs of Buenos Aires.—A. H. HUNTER.

BROWN, H. W., & SHELDON, A. J. (1940). **Natural Infection of Fleas with the Dog Heartworm** (*Dirofilaria immitis*).—*N. Amer. Vet.* **21.** No. 4. 230-231. 1 table. [6 refs.]

The occurrence of early developmental stages of *D. immitis* in *Ctenocephalus felis* has been previously reported by one of the authors [*V. B.* **10.** 101]. In the present paper the dissection is reported of 28 fleas of this species, from a bitch whose blood contained about ten microfilariae per 0·1 c.c. Twelve of the fleas were found to be infected, some with only one stage of the parasite, some carrying two or three stages simultaneously. Microfilariae such as occur in dog's blood were found in the mid- and hind-gut of the flea, sausage-shaped developing larvae in the Malpighian tubules, and large, filariform, presumably infective larvae in the body cavity. No larvae were found in the thorax or proboscis of any of the fleas.—E. S.

OTTO, G. F., & ABRAMS, E. (1939). **Quantitative Studies on the Effect of Heat on Trichina** (*Trichinella spiralis*) **Larvae.**—*Amer. J. Hyg.* Sect. D. **29.** 115–120. 2 tables. [6 refs.]

Six rats were fed with larvae, and were treated by diathermy 27–33 days later. The temperatures used varied from 42°–46°C. but they had no injurious effect on the larvae. Experiments *in vitro* confirmed that a temperature of 55°C. is the minimal temperature which quickly kills practically all the larvae.—A. L. W.

IMMUNITY

MARCUSSON, E. (1940). Aktiverar tuberkulinet i de doser som användas för diagnostiskt syfte den tuberkulösa processen? [**Do Tuberculin Tests Activate Tuberculous Processes?**].—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 218–229. [English summary].

It has been established in human medicine that the application of a tuberculin test is capable of aggravating tuberculous processes already present. M. consequently investigated this phenomenon in cattle practice and over the course of some five years he found numerous instances of a flare-up of TB. in tuberculin-tested cattle and many instances of TB. appearing on clinical examination for the first time after tuberculin testing. Several case records are given in which the evidence supported this theory.

M. points out that the dose of tuberculin per unit of body weight used for cattle is 100 or more times that used for human beings; thus it is possible that the

commonly used tuberculin tests for cattle do in fact have a very stimulating effect on tuberculous lesions, whereby fresh cases of open TB. are engendered. It is therefore likely that tuberculin testing may lead to a rapid spread of TB. in herds. Consequently it is very important to remove reactors quickly after the test or else to carry out tests for open TB. a short time after tuberculin testing.—J. E.

WILLIS, H. S. (1940). **The Story of Tuberculin.**—*Amer. Rev. Tuberc.* **41.** 573–581.

A general review.

—. (1938). **The Purification of Tuberculin.**—*Amer. Rev. Tuberc.* **38.** 523–526. [4 refs.]

Studies over the last ten years by SEIBERT and co-workers have shown that a series of products, all protein in nature, are present in the tubercle bacillus and the culture medium on which it is grown, and all show tuberculin activity. By various methods of separation and isolation an ultimate product, the active principle of Koch's Old Tuberculin, has been prepared and is known as the Purified Protein Derivative of Tuberculin. This P.P.D. itself can elicit a skin reaction in TB. infected animals but gives rise to no antibodies in the animals. By the use of physical-chemical methods and especially by Svedberg's ultra-centrifuge technique, SEIBERT showed that P.P.D. itself is not a pure protein but is a mixture of a main bulk of protein of M.W. 16,000 (about) with other substances of large and small M.W. This does not affect the practical use of P.P.D. which can be prepared in a constant manner with identically reproducible properties and potency. The American findings have been repeated and confirmed by British workers who further agree that P.P.D. is the best reagent so far produced for diagnostic tests in man, whilst Danish workers have also prepared a modified P.P.D. and have proposed the preparation of an international standard of tuberculin of the same strength as P.P.D. or the corresponding Danish preparation.—ALFRED EDEN.

MCCARTER, Janet, KANNE, Elizabeth M., & HASTINGS, E. G. (1939). **Precipitins for the Tuberculin Proteins of Acid-Fast Bacteria.**—*J. Bact.* **37.** 461–469. 3 tables. [10 refs.]

By means of the precipitin test the tuberculin proteins of the human, bovine and avian strains were mutually distinguishable, but those of avian strains, isolated from the chicken, cow and pig could not be so differentiated from that of Johne's bacillus. The tuberculin proteins of two saprophytic acid-fast bacteria isolated from a cow and from a pig were distinguishable from each other and from the proteins of the tubercle bacilli and of Johne's bacilli. Although the precipitin test with tuberculin proteins as antigens was useful in identifying unknown acid-fast bacteria, considered along with cultural and pathogenic characteristics, further purification of the protein solutions would appear necessary before this test is able to replace other methods of identification of acid-fast bacteria.—ALFRED EDEN.

SEIBERT, Florence B., & DUFOUR, Emma H. (1940). **Purified Protein Derivative. Its Isolation from Old Tuberculin and Fractionation of the Residue.**—*Amer. Rev. Tuberc.* **41.** 57–70. 8 tables. [15 refs.]

No significant differences in potency, electrophoretic mobility or other characteristics were found between a specific purified protein derivative isolated from a market sample of Old Tuberculin (O.T. Lot 771) and the P.P.D. prepared in the standard way from growths of tubercle bacilli on synthetic culture media. In addition to the P.P.D. isolated from 771, two other fractions were prepared :– (1) all the original material passing through the ultrafilter, and (2) the portion

consisting chiefly of polysaccharide obtained from the non-filtrable liquid after the removal of the P.P.D. by trichloracetic acid. These fractions elicited non-specific inflammatory reactions in normal animals and man at dilutions corresponding to 1 : 2·5 and 1 : 5 of the original O.T., whereas at the same concentrations the P.P.D. preparation either from synthetic media or O.T. caused no reactions. These reactions were not found after injections in dilutions corresponding to the usual test doses of O.T., though it is possible that reactions might be caused by sensitization to these non-tuberculin substances, leading to false positive results, and that these substances might enhance the action of the specific substance of O.T. (Lot 771) in sensitive subjects, leading to stronger reactions than those given by O.T. alone.—ALFRED EDEN.

I. MEYRIEUX, M. (1938). Diagnostic des Brucelloses par Percuti-Réaction. [**Diagnosis of Brucellosis by the Endermic Test**].—*Arch. internat. Brucelloses.* **1.** 171–173. [1 ref.]

II. OTERO, P. M., & GONZÁLEZ, L. M. (1939). **Allergy in Brucella Infections.** —*Proc. Soc. exp. Biol., N.Y.* **40.** 100–102. 1 table. [15 refs.]

I. M. describes the preparation of special antigens (10- and 20-day cultures of bovine and porcine strains of *Br. abortus*, concentrated to the consistency of a paste) for endermic tests for human brucellosis.

II. The authors have previously [*V. B.* **9.** 98.] described the preparation of purified protein antigen from brucella. They now describe its use for intradermal tests.

Out of 212 persons in contact with cattle infection, 63 developed positive reactions. In other tests carried out on these persons, positive reactions were obtained as follows :– agglutination 5, complement-fixation 7 and opsono-cytophagic 46. There was no correlation between cutaneous allergy and the other immunological reactions. It is suggested that positive allergy merely signifies contact with infected material, and is no proof of actual infection.—C. V. WATKINS.

TOMAŠEC, I., & OKLJEŠA, B. (1939). Prilog intrakutanoj reakciji za ustanovljenje Bangove infekcije. [**Use of the Intradermal Test for Brucellosis**].—*Vet. Arhiv.* **9.** 309–330. 4 tables. [Numerous refs.] [German summary].

VYSHELESSKIĬ'S [*V. B.* **6.** 437.] intradermal test for brucellosis was carried out on 46 g. pigs, 11 sheep, 11 cows and 3 heifers, all artificially infected, and also on 546 cattle in infected and non-infected herds. The percentage of positive reactions in the artificially infected animals was 89 in g. pigs (at 10th day), 91 in sheep (at 10th day) and 54 in the bovines (some on 10th and some on 20th days). In the field tests on the 546 cattle, 210 animals in herds regarded as clean were tested intradermally and also by the agglutination test. Negative reactions to both tests were given by 200 cattle. Of the remaining ten, the results were inconclusive in six ; in the other four the aggl. test was negative and the intradermal reaction positive. In 56 other cattle, both the intradermal test and the aggl. test were negative in 55 cases. Other 275 cattle in infected herds were also tested by both methods. The results of the two methods differed substantially, agreeing only in 60 % of the cases ; thus 56 out of 183 cattle negative to the aggl. test reacted positively to the intradermal test. [No mention is made of the remaining five out of the 546 cattle tested.]

Thus results coincided almost completely in clean herds and also in infected herds so far as positive results to the aggl. test were concerned. The authors conclude that in order to elucidate the reason for the discrepancy of results found in infected herds, further tests should be made with artificially infected bovines ;

the detailed previous history of each animal reacting positively to the intradermal test but negatively to the aggl. test should be established and its subsequent history recorded, its milk, etc., examined for brucella during life and its organs after slaughter, and that the intradermal test should be compared with other diagnostic methods.—B. OSWALD (NOVI, YUGOSLAVIA).

ZARUBKINSKIĬ, V. S., & KHODZHIBEKOV, S. (1938). K voprosu spetsifichnosti abortina Dubois pri brutselleze krupnogo rogatogo skota. [**The Specificity of Abortin for the Diagnosis of Bovine Brucellosis**].—*Trud. Uzbek. nauchn.-issled. vet. Stan., Tashkent.* **9.** 12–18. 4 tables. [English summary].

The authors tested the specificity of the intradermal reaction to abortin in 15 young cattle [ages not given] artificially infected with *Br. abortus*, with 14 healthy young cattle as controls. The tests were made at fortnightly intervals and the reactions judged after 72 hours, the first test having been made 10 days after infection. The reactions were positive in all infected animals. No non-specific reactions or anergy were observed and the conclusion is drawn that abortin can be a valuable aid in the eradication of brucella infection in cattle as it renders possible early diagnosis and the consequent removal of infected animals.—E. MARTIN.

APOLLOSOVA, P. A. (1938). Vliyanie temperatury v 100°C. i vyshe na aktivnost' abortina. [**The Effect of Heat on the Activity of Abortin**].—*Trud. Uzbek. nauchn.-issled. vet. Stan., Tashkent.* **9.** 22–26. 2 tables. [English summary].

A. found that abortin lost none of its activity or specificity when heated to 100° and 120°C., and he recommends that in order to ensure sterility, the preparation should be heated to 120°C. for a period of 30 minutes instead of to the usual 70°C.—E. MARTIN.

VOLKOVA, A. A. (1938). Sravnitel'naya otsenka reaktsii agglyutinatsii moloka kak metoda diagnostiki brutselleza. [**The Agglutination Test with Milk for the Diagnosis of Brucella Infection**].—*Trud. Uzbek. nauchn.-issled. vet. Stan., Tashkent.* **9.** 3–11. 8 tables. [15 refs.] [English summary].

The author found [as is established] that tests on blood serum for brucella infection are more reliable than tests on whey.—E. MARTIN.

HINSHAW, W. R., JONES, E. E., HARR, J. F., & NIEMEYER, W. E. (1940). **Comparison of the Tube and the Whole Blood Tests for Pullorum Disease of Turkeys.**—*Cornell Vet.* **30.** 30–38. 4 tables. [8 refs.]

The authors used the stained antigen of SCHAFFER, MACDONALD, HALL, & BUNYAN (1931) for their whole blood plate tests and the standard tube method as used by JONES (1913), in comparable tests for *Salmonella pullorum* carriers among turkeys. They recommend a dilution of 1 : 25 for the latter test as the critical positive titre, but emphasize that partial reactions may be expected. The personal factor in the interpretation of results is therefore important. They do not advise reliance on these tests, but recommend that all reactors be fully examined by methods which include culture tests.

They report results based on 7,714 agglutination tests from 13 flocks and on 241 P.M. examinations of reactors. Out of 467 reactors, 148 were positive to both tests, 248 to the tube test only and 71 to the whole blood test only. Cultural tests of 72 of these reactors were positive.

A comparison of the results of the two methods of testing made in three different ways showed that the whole blood test was only about half as efficient as the tube test.—C. V. WATKINS.

DISEASES, GENERAL

VIANELLO, G. (1938). Localizzazione e risveglio del carbonchio ematico nei bovini, in seguito alle inoculazioni sottocutanee di siero iperimmune antiaftoso. [**Infection of Cattle with Anthrax at the Site of Inoculation after Subcutaneous Administration of Foot and Mouth Disease Serum**].—*Clin. vet., Milano.* **61.** 639–658. 5 figs. [10 refs.]

A brief account is given of cases in which cows kept in three different establishments died from anthrax commencing at the site where they had received subcutaneous injections of 150–200 c.c. of F. & M. disease hyperimmune serum. Investigations are claimed to have shown that anthrax infection was present in all three establishments prior to the F. & M. disease treatment, and from a study of the temperature charts of the stabled cows it is claimed that practically all the animals were affected with anthrax in a latent form, the organisms being confined in the vascular system. Data from literature, supported by personal experiments, led V. to believe that in such animals the subcutaneous injection of massive doses of the F. & M. serum, by rupturing small blood vessels, released the anthrax bacillus from the blood stream ; the localization of anthrax at the point of injection is attributed to the slightly haemolytic properties of the carbolized (0·5 %) F. & M. serum, which sets up a slight inflammatory process in the subcutaneous tissues, and to the specific affinity of the anthrax bacillus for these tissues. The sterility of the F. & M. disease serum used is stated to be fully guaranteed by the precautions taken in its preparation, and to have been further confirmed by control tests. It is suggested that where anthrax infection is present or suspected the injections of the F. & M. disease serum should be made intravenously and not under the skin.

KARSTEN. (1939). Die Maul- und Klauenseuche als Hilfsursache der Abortus-Banginfektion. [**Foot and Mouth Disease as Predisposing Factor in *Brucella abortus* Infection**].—*Dtsch. tierärztl. Wschr.* **47.** 103–105.

K. gives histories of three herds in which, following the appearance of F. & M. disease, there were epidemics of contagious abortion. In two of these herds F. & M. disease prophylactic serum was administered and K. discusses the possibility that this treatment may have given rise to abortion ; the serum was proved, however, to be free from *Br. abortus*. The probable cause of the epidemic is believed to be the lowered resistance of animals affected with F. & M. disease, and it is recommended that the secondary condition should be controlled by methods of intensive segregation.—S. J. EDWARDS.

ANDERSSON, N. (1939). Hudtuberkulos-problemet. [**Skin Lesions in Tuberculin-Reacting Cattle**].—*Svensk VetTidskr.* **44.** 339–366. 9 tables.

In continuation of earlier work [*V. B.* **9.** 142] A. reports the results of further observations on " skin lesion reactors ". In 1938 he saw 302 cases in 164 herds out of 5,000 animals comprising 372 herds which were tuberculin tested. Only three cows in these herds were tuberculous according to the test. The cattle in 128 of the 164 herds were tested with human, bovine and avian tuberculins and the highest proportion of reactions occurred to bovine tuberculin in one herd, to human tuberculin in 97 herds and to avian tuberculin in 19 herds, no such distinction being forthcoming in the rest.

A colleague carried out similar tests on 13 herds at Visby, Gotland and obtained the highest proportion of reactions with avian tuberculin in 79 cattle affected with " skin lesions ".

Herd test tables for four years are given for some herds in which " skin lesion " cases occurred ; they show the character of the reactions obtained with the three types of tuberculin.

A. discusses the nature of " skin lesion " cases and suggests that the infection is due to organisms saprophytic in pasture land : this view is supported by the localized grouping of his cases. He has found that the extirpation of " skin lesions " may lead to loss of sensitivity to tuberculin and that cases left alone also lose their reactibility. No case of relapse with fresh lesions has been seen in a beast which had a " skin lesion " previously : it is possible that cattle become immune after recovery.

The " skin lesion reactor " problem is closely linked with true bovine TB., and with human and avian types of infection and it is very difficult to differentiate them. A policy of " wait and see " combined with repeated tuberculin testing is necessary.

A. finally lists six conditions which give grounds for suspicion of the existence of " skin lesion " cases and two conditions which indicate them without doubt.

—J. E.

—. (1940). **Report of the Research Committee on Diseases of Young Calves [Royal Agricultural Society of England].**—*J. R. agric. Soc.* **100.** Pt. III. 80–81.

Under certain conditions of growth a toxin is formed by *Corynebacterium pyogenes* which can be measured by its effect on laboratory animals and by its haemolytic power. The antitoxin present in the serum of animals can be measured by its antihaemolytic power. It was found that larger amounts of antitoxin were present in the sera of cattle, sheep, pigs and goats than in the sera of human beings and rabbits, while the serum of horses occupied an intermediate position. In cattle the antitoxin content tended to increase with age. The amount of antitoxin can be raised by injection of the specific toxoid.—F. T. Boyle.

Donatien, A., & Lestoquard, F. (1939). Sur une maladie nouvelle du porc. **[A New Infectious Disease in Swine Immunized against Swine Fever].**—*Bull. Acad. vét. Fr.* **12.** 298–301.

The disease which the authors describe occurred amongst pigs which had been immunized or hyperimmunized against swine fever. It was an acute infectious and extremely fatal disease ; of 21 affected animals only one survived. The onset was sudden, the temperature reaching 41°C. or over and remaining high until shortly before death. The animal was prostrate, neither ate not drank and generally lay flat on its side. A small number of dark spots were found on the internal surface of the upper parts of the limbs. Respiratory movements were sometimes doubled and froth was sometimes seen on the nose.

At P.M. examination the most striking finding was gross enlargement of the spleen which might weigh 2 kg. in a pig of 250 kg. and be 75 cm. in length. The capsule tore easily and the pulp was black and friable. The liver was congested. The kidneys showed haemorrhages externally and internally. The external lymph nodes were congested and those of the body cavities were haemorrhagic. The bone-marrow was reddish purple. Another important sign was the uniform, reddish purple or dark red colour of the gastric mucous membrane. Inflammation was sometimes present in the small intestine and more often there was acute colitis. The lungs were normal or oedematous. Histological examination showed the nervous system to be normal. Marked degenerative and inflammatory changes were present in the spleen, bone-marrow, liver and kidneys. The myocardium

showed small haemorrhages. Microscopic and cultural examinations usually showed nothing, once salmonella, once streptococci. Sub-inoculations by the subcutaneous or intracerebral routes were negative in mice, rats, g. pigs, rabbits and monkeys. The pig alone was apparently susceptible.

The disease was easily transmitted by small quantities of blood (0·25 c.c.) or blood-containing organs (1 c.c. of a 1 : 5 suspension of bone-marrow), the incubation period and period of illness each being three days. In pigs hyperimmune to swine fever and given large doses, the incubation period was 4–10 days, and the course prolonged, but death followed in all but one animal. The urine was virulent and the disease was transmitted by cohabitation. A pig inoculated with 35 c.c. of an L 1 *bis* filtrate from blood laked with three volumes of distilled water died after six days. It is suggested that the disease be named " pig typhus " (" typhus du porc ").—A. W. Stableforth.

Kulakov, K. A. (1935). Morfologicheskie izmeneniya pri infektsionnoĭ plevropnevmonii koz v Uzbekistane. [**Morphological Changes in Infectious Pleuro-Pneumonia in Goats**].—*Bull. Uzbek. nauchn.-issled. vet. Inst., Tashkent.* Nos. 1–2. pp. 55–61. 7 figs. on 2 plates.

This is a description of the macroscopic and microscopic changes observed in 52 goats which were affected with contagious pleuro-pneumonia and which died or were killed at various stages of the disease.—E. Martin.

Green, R. G., Larson, C. L., & Mather, D. W. (1938). **The Natural Occurrence of Shock Disease in Hares.**—*Trans. 3rd N. Amer. Wildlife Conf., 1938.* pp. 877–881. [6 refs.] Washington : American Wildlife Institute.

It is suggested that the periodic decline in the snowshoe hare population is due to " shock disease " and that hares actually die in the wild of " shock disease " when not affected by artificial conditions or confinement.

Forty-one female and ten male hares were placed in a 1·7-acre fenced range of typical cover, from April to June, and supplementary food was given to ensure that the nutritional conditions were good. Twenty females and eight males died during the studies which ended in November. In nearly all cases death was due to " shock disease ". Of 115 hares born in the range during the experiment only eight were alive in November. Many died when 5–7 weeks old. The duration of illness varied from 29 minutes to three days. The experiment is regarded as conclusive, and special significance is attached to the recognition of shock disease as a potent lethal factor in the destruction of immature hares under natural conditions. [For a description of the disease, see *V. B.* **10.** 444.]—D. D. Ogilvie.

Best, C. H., & Solandt, D. Y. (1940). **Concentrated Serum in Treatment of Traumatic and Histamine Shock in Experimental Animals.**—*Brit. med. J.* May 18th. 799–802. 4 figs., 1 table. [Numerous refs.] [Authors' summary copied *verbatim*].

Shock in experimental animals was produced by histamine administration, by trauma with extensive haemorrhage, and by trauma with little or no haemorrhage. These three types of shock were successfully treated by the intravenous administration of pituitrin and concentrated blood serum. The possible clinical application of these results is pointed out.

I. Dalling, T. (1938). **Lymphomatosis [Fowl Paralysis] in Great Britain.**—*Rep. 13th int. vet. Congr. 1938.* **2.** 816–827. [Numerous refs.] [In English : French, German and Italian summaries. Discussion pp. 846–847 in English].

II. STUBBS, E. L. (1938). **Lymphomatosis.**—*Ibid.* 828–837. [Numerous refs.] [In English: French, German and Italian summaries. Discussion pp. 846–847 in English].

I. Lymphomatosis was first described in Great Britain in 1929. The findings of the Poultry Technical Committee of Great Britain in 1937 [*V. B.* **8.** 395.] indicated that the disease is responsible for much widespread loss.

It is suggested that the term "lymphomatosis" better describes the disease than "neurolymphomatosis" which emphasizes the infiltration in nervous tissue to the exclusion of other tissues. It has been shown that the typical infiltrating cell, while causing lesions in the nerves, may infiltrate other organs in the same bird, the latter infiltration often assuming the form of tumourous masses.

There is often difficulty in determining the pathogenic significance of the typical infiltrating cells, as they are frequently seen in relatively small numbers in the organs of apparently normal birds, particularly in the liver.

The cells seen in the lesions are young lymphoblasts, cells resembling the mammalian plasma cell; less commonly polymorphonuclear leucocytes are seen. Inclusion bodies have not been reported. The origin of the lymphoblasts seen has not been established. Early lesions in the disease appear to be associated with small blood vessels.

Eye changes in outbreaks of lymphomatosis are common, complete or partial paralysis of the iris with consequent distortion of the pupil may be an outstanding symptom.

The changes seen in the blood picture during the course of the disease are discussed. The increase in the total white cell count which may accompany lymphomatosis is of little diagnostic value, as this feature does not appear to be specific.

The cause of the disease is not known. It is believed by some workers to be infective and in the nature of a virus, while others believe it to be neoplastic in origin. Neither of these views has been established.

D. briefly reviews the observations of numerous investigators on lymphomatosis in the United Kingdom, drawing the following conclusions:–

"Much evidence exists concerning the spread of the disease by the introduction of hatching eggs, day-old chicks and older fowls to farms presumably free from the disease. Transmission from parent to offspring through the egg is apparently proved. Concerning other methods of spread, *e.g.* contact between healthy and diseased birds, there is not yet sufficient evidence to draw definite conclusions. . . .

Some strains of birds appear to be more liable to develop lymphomatosis than others, though the results of controlled breeding experiments seem to indicate that individual pullets in an apparently affected strain play the important part in the transmission of the disease to their progeny. There is some evidence that this may also apply to cockerels.

Experimental evidence shows that strains of birds in which no apparent infection is present may, when submitted to certain conditions on poultry farms, develop marked evidence of lymphomatosis and that birds bred from highly infected stock may, when removed to clean premises, show a much lower incidence than those left among the original infected stock".

It appears possible to reproduce the disease by the injection of tissues from affected birds, but strains of birds vary in their susceptibility to such procedure.

It is suggested that more research work on an extensive scale is urgently needed.

II. Lymphomatosis is a term commonly used to indicate a hyperplasia or proliferation of lymphoid tissues. The term is used to include a wide variety of conditions comprising a group of diseases the only common characteristic of which is the presence in abnormal proportions of cells of the lymphoid series. One group of investigators restricts the use of the word to that disease known as fowl paralysis. Others use the word to include conditions in which the typical round cells have invaded other organs besides nerves. Finally, some workers use the

term lymphomatosis to describe infiltrations in nervous tissue, various tumours in other organs, " big liver disease " or hepatolymphomatosis and certain forms of leucosis, believing that these are but different manifestations of the same disease syndrome. The aetiology and epidemiology are not well understood.

Early workers believed that coccidiosis played an important part in the cause of the disease, but it has been shown that lymphomatosis occurs in the absence of coccidiosis or other intestinal parasites. Many consider that a virus is the cause, but this has not been proved. It is believed by some to be transmitted through the egg ; others think that hereditary susceptibility or resistance play an important role in its occurrence. Attempts have been made to demonstrate the presence of a causal agent in the faeces of affected birds. One worker is of the opinion that bacteria belonging to the genus *Salmonella* produce haemocytoblastosis which is the primary disease and may later manifest itself in all the different forms of lymphomatosis and leucosis.

A brief description is given of the disease as it occurs in the field when paralysis is the chief symptom. The symptomatology and pathology are described.

The results obtained from the large numbers of transmission experiments made are conflicting, but the majority of workers appear to believe that lymphomatosis can be artificially transmitted. On this point, however, there is much difference of opinion.

The results of some of the research into transmission indicate a circulating causal agent. Some of the experiments give no evidence to show any aetiological relationship between lymphomatosis and the leucaemias ; yet the results of others would indicate a common aetiological agent. S. considers that it is improbable that leucaemia and lymphomatosis have a common cause. It is generally agreed that hepatolymphomatosis, the lymphoid leucosis of ELLERMAN, has not been successfully transmitted artificially.

Diagnosis is based upon the clinical symptoms, the P.M. findings and the demonstration, microscopically, of the accumulations of the typical infiltrating cell. No test has been elaborated which has proved of value in diagnosis. In the present state of knowledge of lymphomatosis, general recommendations only as to the control of the disease can be given. These follow the lines laid down in dealing with an infectious disease. Eggs for hatching should be taken from groups in which the disease has not appeared in previous years. Other diseases should be rigidly controlled, as the incidence of lymphomatosis appears to be higher in groups debilitated by such diseases as coccidiosis and other forms of parasitism, by pullorum disease and by deficiency diseases. No medicinal or biological treatment has proved of value.

In the discussion which followed it was stated that fowl paralysis is but one of the causes of the heavy mortality occurring in poultry flocks in Great Britain ; good husbandry, by increasing resistance to disease generally, tends to reduce the clinical evidence of the disease, although it is not caused by faulty feeding or bad hygiene. BUTLER believed that nutritional treatment, particularly in keeping up the vitamins A and E content of birds, would control the disease.—L. E. HUGHES.

WINER, J. H., & SCHROEDER, C. R. (1940). **Malignant Hepatoma in the White-Tailed Deer (Odocoileus osceola).**—*Amer. J. Cancer.* **38.** 268–270. 2 figs. [5 refs.] [Authors' summary copied *verbatim*].

(1) A case of malignant hepatoma with adrenal metastasis in a deer is reported.

(2) This is a rare tumor in this country [U.S.A.] ; it is reported more frequently in the foreign literature.

NUTRITION IN RELATION TO DISEASE

ALLCROFT, W. M., & GREEN, H. H. (1938). **Seasonal Hypomagnesaemia of the Bovine, without Clinical Symptoms.**—*J. comp. Path.* **51.** 176–191. 4 figs., 3 tables. [13 refs.]

A herd of 89 Hereford cows on a farm in Kent, at pasture all the year round, showed a seasonal variation in serum Mg from a maximum in August to a minimum in December followed by a rise again in February. The fall in serum Mg was often to less than half the summer value, without any manifestation of clinical symptoms of tetany or of nervous hyper-excitability. In a control group the addition of MgO to a mineral lick fed to the cows appeared to limit the sharp fall in serum Mg from October to December, but there were no differences in the levels upon return to more normal values in February. There was no suggestion of pasture Mg deficiency. No explanation is offered to account for the seasonal fluctuation of serum Mg levels.—ALFRED EDEN.

MADSEN, D. E., & NIELSEN, H. M. (1939). **Parturient Hemoglobinemia of Dairy Cows.**—*J. Amer. vet. med. Ass.* **94.** 577–586. 2 figs., 2 tables. [16 refs.]

This is a disease of high-producing dairy cows, occurring 2–3 weeks after calving and characterized by hydraemia, oligocythaemia, icterus and usually haemoglobinuria [see *V. B.* **9.** 875]. Necrosis of the skin of the teats and extremities occurs. The disease occurs during the period when cattle are housed and attacks cows between the third and sixth calving. Convalescent cows frequently show a depraved appetite. Cows placed on a ration containing liberal amounts of grain make a more prompt and complete recovery than those fed on alfalfa hay and beet pulp. There was a mortality of 19·4% in 242 cases. No causal micro-organisms could be incriminated and no enterotoxins could be found. The disease could not be transmitted by inoculation. It is suggested that malnutrition may play a part as it occurs more frequently on unfertile farms or when drought conditions prevail. The blood plasma was very low in inorganic phosphorus.
—J. A. GRIFFITHS.

QUIN, A. H. (1939). **Hemoglobinemia in Cows Caused by Phosphorus Deficiency.** —*Vet. Med.* **34.** 320–321.

Reference is made to the paper by MADSEN and NIELSON [see preceding abstract]. Q. states that this disorder can be cured by the administration of phosphate. It is suggested that haemoglobinuria in calves may be due to a similar phosphate deficiency.—R. ALLCROFT.

BERRY, J. L. (1939). **Redwater in Cows after Calving. (Post-Parturient Haemoglobinuria of Cattle).**—*Tasm. J. Agric.* **10.** 7–9.

It is stated that post-parturient haemoglobinuria causes considerable losses in north-east Tasmania. The disease has a seasonal incidence, spring and early summer, and affects only mature dairy cows after the third calving, commonly at from 2–6 weeks after parturition. It seems to be related to heavy feeding on cruciferous root crops, turnips and *chou moellier*. The symptoms described by B. agree in general with those described for a similar, probabably identical, condition reported from other countries [see *V. B.* **6.** 537, and MADSEN and NIELSON, above]. P.M. examination shows some degree of jaundice, thin, watery blood and blood-stained fluid in the abdominal cavity and in the pericardial sac. Areas of erosion have consistently been found in the abomasum. Symptomatic treatment

is outlined. For prevention, a well-balanced diet is recommended with restriction of turnips to 45 lbs. per day, after a feed of hay ; grazing on *chou moellier* should be restricted to three hours daily.—N. J. SCORGIE.

SNOOK, L. C. (1939). **Fatty Infiltration of the Liver in Pregnant Ewes.**—*J. Physiol.* **97.** 238–249. 5 figs. on 1 plate, 4 tables. [13 refs.]

Fatty infiltration of the liver is not a normal concomitant of pregnancy in the rat, rabbit, g. pig or sheep. This condition may be associated with ketosis in the pregnant ewe, without provoking harmful symptoms and the animals may lamb normally even though the infiltration is extreme. In ketonaemic pregnant ewes, the glycogen content of the liver is apparently reduced to negligible amounts. Ketonaemic ewes in apparently good health were found to have livers infiltrated with fat, the nature and degree of the infiltration being indistinguishable from that seen in comatose ewes. The fatty infiltration produced in experimental ewes could not be distinguished from that found in the field cases of the disease. The condition was not associated with necrotic changes in the liver tissue.—F. T. BOYLE.

I. MOORE, C. V., ARROWSMITH, W. R., QUILLAN, J. J., & READ, J. T. (1937). **Studies in Iron Transportation and Metabolism. I. Chemical Methods and Normal Values for Plasma Iron and " Easily-Split-Off " Blood Iron.**—*J. clin. Invest.* **16.** 613–626. 10 tables. [Numerous refs.]

II. MOORE, C. V., DOAN, C. A., & ARROWSMITH, W. R. (1937). **Studies in Iron Transportation and Metabolism. II. The Mechanism of Iron Transportation : Its Significance in Iron Utilization in Anaemic States of Varied Etiology.**—*Ibid.* 627–648. 14 figs., 3 tables. [Numerous refs.]

III. MOORE, C. V., MINNICH, V., & WELCH, J. (1939). **Studies in Iron Transportation and Metabolism. III. The Normal Fluctuations of Serum and " Easily Split-Off " Blood Iron in Individual Subjects.**—*Ibid.* **18.** 543–552. 9 figs., 1 table. [17 refs.]

IV. BROCK, J. F. (1937). **The Relation Between the Hypochromic Anaemias and Iron Deficiency.**—*Brit. med. J.* Feb. 13th. 314–320. 2 figs., 1 table. [Numerous refs.]

V. BROCK, J., & HUNTER, D. (1937). **The Fate of Large Doses of Iron Administered by Mouth.**—*Quart. J. Med.* **30.** 5–13.

VI. MCCANCE, R. A., & WIDDOWSON, E. M. (1937). **Absorption and Excretion of Iron.**—*Lancet.* **233.** 680–684. [Numerous refs.]

VII. FOWLER, W. M., & BARER, A. P. (1937). **Retention and Utilization of Orally Administered Iron.**—*Arch. intern. Med.* **59.** 561–571. 5 tables. [17 refs.]

VIII. MCCANCE, R. A., & WIDDOWSON, E. M. (1938). **Absorption and Excretion of Iron Following Oral and Intravenous Administration.**—*J. Physiol.* **94.** 148–154. 3 tables. [9 refs.]

IX. HAHN, P. F., BALE, W. F., LAWRENCE, E. O., & WHIPPLE, G. H. (1939). **Radioactive Iron and Its Metabolism in Anemia. Its Absorption, Transportation, and Utilization.**—*J. exp. Med.* **69.** 739–753. 2 tables, 1 chart.

I. Improved and more accurate methods for the determination of plasma and " easily-split-off " blood Fe showed that the normal range for human plasma (and serum) is from 0·05–0·18 mg. %. When whole blood is modified, from 5–10 % of the total Fe is dialysable ; with HCl acidification the " easily-split-off " Fe varied from 1·499–3·154 mg. % ; with H_2SO_4 and HNO_3 the figures were greater, varying from 2·947–4·786 mg. % (all with acids of about 0·1 N strength). The statement that this " easily-split-off " Fe is an organic, non-haemoglobinous form of Fe awaits further proof.

II. Full details are given of the levels of the various Fe fractions of blood of human beings suffering from various types of anaemia. The authors' studies lead them to conclude that Fe is transported as plasma Fe and that the level of the latter is influenced by a large number of factors. The " easily-split-off " Fe fraction appears to be relatively much more constant and whereas its physiological function has yet to be defined, they cannot agree with BARKAN that the Fe transport of the body is directly concerned with this fraction.

III. Variations of from 0·01–0·065 mg. % in the level of serum Fe occurred in a given normal subject within the daily cycle and during a six-month period in a purely random manner and no material alteration of this level was caused by liver or Fe medication. The extent of variation of the " easily-split-off " Fe in a normal human adult was as much as 1·48 mg. %, and was unrelated to Fe or liver therapy. The physiological importance of this latter blood Fe factor now appears to be unconnected with the function of Fe transportation.

IV. After a general discussion of hypochromic anaemia and the Fe exchange of the human body, three cases are reported which were treated by massive doses of Fe. The main thesis of the paper is to show the greater effectiveness of *excess* Fe as compared with *enough* Fe. There is further discussion on the use of ferrous salts, the mode of action of large doses of Fe, and on rational Fe therapy, for fuller details of which the original should be consulted.

V. In metabolism experiments with both anaemic and non-anaemic human patients the retention of Fe orally administered was studied. When large doses of Fe, as iron and ammonium citrate or Blaud's pill, were given, considerable quantities of Fe were retained in the body (difference between Fe intake and output), much greater than could be deduced from the amount retained as measured by the rate of Hb response. The conclusion is deduced that with these large doses of Fe, utilization is by no means a measure of the actual retention.

VI. The more important experimental findings on Fe metabolism are summarized and discussed. The authors conclude from a study of the literature and their own work that the capacity of the bowel to excrete Fe, particularly its capacity for regulating the amount, has been exaggerated. The main indications are, they contend, that in man and certain animals the bowel excretes practically no Fe. A new theory of Fe absorption, depending upon the concentration of free Fe in the plasma, is propounded and it is claimed that much of the existing data on Fe metabolism can be thus better explained than by the old idea of extensive absorption and re-excretion.

VII. Metabolism trials conducted on human patients suffering from hypochromic anaemia showed that the body retains large amounts of Fe administered as iron and ammonium citrate. With ten patients there was an average retention of 32·6 % of the Fe administered orally and about 1·96 % of this Fe was utilized for Hb formation. There was no correlation between the amount of Fe retained and the increase in Hb content.

VIII. On normal diets containing 5·9–8·6 mg. Fe per day three men and three women were in Fe balance, all but 0·1 mg. Fe being excreted in the faeces. When this intake was doubled all the supplementary Fe was excreted and the subjects were again in balance. In a third experiment 7 mg. Fe were daily injected intravenously for 14 days but within the limits of experimental error none of this Fe was excreted into the gastro-intestinal tract. The results are claimed to substantiate the theory that the intestine has no power of regulating by excretion the amount of Fe in the body.

IX. By the use of radioactive Fe it is shown that the need of the body for Fe determines the amount absorbed ; in anaemic dogs Fe was rapidly assimilated

whereas in the normal dog absorption is very slight. The absorbed Fe is transported in the blood plasma from the alimentary tract to the site of Hb formation. Through the use of labelled radioactive Fe atoms the speed of absorption and transfer of Fe to the R.B.C. was found to be much more rapid than was previously supposed. The important role of the liver and the bone-marrow in Fe metabolism is strikingly confirmed.—ALFRED EDEN.

WELLS, H. E. (1940). **" Swayback " Disease in Lambs : Investigations in North-West Derbyshire.**—*J. R. agric. Soc.* **100.** Pt. III. 74–78. 1 appendix. [5 refs.]

This article deals with the investigations which have been conducted in north-west Derbyshire in an attempt to eradicate " swayback " which is the most serious sheep disease of the district [see also *V. B.* **9.** 492].

A feeding experiment was undertaken involving 1,807 ewes on 51 farms. It was found that the incidence of " swayback " was very low in the offspring of those ewes which had received separate licks containing copper, whereas it was high in those not receiving such supplements.

In a second experiment, details of which are recorded with tables, " swayback " was controlled by supplying the ewes with traces of copper throughout the gestation period. It is recommended that 0·3 % copper licks should be introduced at the time when the ewes go to the ram and that the ewes should be allowed access to the licks during the gestation period. When the licks are not introduced until after the new year it is advisable to include 1 % of copper to ensure complete control.—F. T. BOYLE.

WITJENS, J. C. (1939). Bestrijding van de " osteomalacie " (osteodystrophia fibrosa) bij de Australische paarden van het Koninklijk Nederlandsch-Indische leger. [**Control of Osteodystrophia in Australian Horses of the Royal Dutch East Indian Army**].—*Ned.-ind. Bl. Diergeneesk.* **51.** 297–327. 7 tables. [German summary].

Calcium deficiency of local grasses had long been suspected as cause of equine osteodystrophic disorder in the Dutch East Indies, and over the years 1910–1926 calcium phosphate had been given at the rate of 50 g. per horse for four days of the week. From 1926 onwards this was changed to 50 g. chalk per head per day, as providing a better ratio of $CaO : P_2O_5$ in the ration as a whole. In absence of calcium supplement, the disorder was confined to the heavier Australian horses while the much lighter indigenous ponies escaped. This is explained on the higher intake of grass in relation to cereal products of the latter. A ratio of $CaO : P_2O_5$ of 1 : 1·5 is regarded as adequate, a ratio of 1 : 2 or wider as producing the disease. A tabular summary of incidence is given for the years 1907–1937, the disease completely disappearing after introduction of the chalk supplement in 1926.—H. H. GREEN.

—. (1940). **Osteomalacia : The Known Factors.**—*Brit. med. J.* March 2nd. 352–353. [8 refs.]

An annotation is given of some of the known factors in the causation of osteomalacia which arises from an imbalance between the utilization and supply of Ca and vitamin D.—R. ALLCROFT.

ENDER, F., & HELGEBOSTAD, A. (1939). Eksperimentell beriberi hos sölvrev. [**Experimental Beriberi in Silver Foxes**].—*Skand. VetTidskr.* **29.** 1232–1244. 5 figs. [2 refs.] [English and German summaries.]

As a result of losses from nutritional disease in foxes, mink and ferrets on

certain Norwegian fur animal farms, research on experimental beriberi in silver foxes was undertaken. Four fox cubs were fed on a vitamin B_1-free diet consisting of casein, corn starch, vegetable fat and a salt mixture to which was added autoclaved brewers' yeast, dry whale meat and $CaCO_3$. A vitamin C supplement was also given. On this diet symptoms of B_1 avitaminosis began to appear after one week, animals being depressed and losing their appetite. Forced feeding was carried out and severe symptoms of beriberi came on after 18–21 days on the special diet. The symptoms in foxes resembled those of beriberi in other animals and consisted of inability to stand, the adoption of unnatural postures and attacks of cramp, either localized or generalized. In severe cases there was opisthotonus. A cure was effected by dosage with aneurin.—J. E.

ENGEL, R. W., PHILLIPS, P. H., & HALPIN, J. G. (1940). **The Effect of a Riboflavin Deficiency in the Hen Upon Embryonic Development of the Chick.** —*Poult. Sci.* **19.** 135–142. 8 figs., 2 tables. [9 refs.]

Evidence is presented that riboflavine has a definite relation to egg production and to embryonic development in the chick. Deficiency of this factor in the diet of the hen led to lowered egg production and increased embryonic mortality in the incubating eggs. Myelin sheath degeneration occurred in the sciatic nerve in about 60% of the surviving embryos obtained from eggs produced by hens on the riboflavine-low diet, and it is thought that the failure of proper development of the nervous tissue due to the deficiency of riboflavine was an important cause of the embryonic deaths. Injection of riboflavine into the incubating egg completely prevented embryonic death.—R. ALLCROFT.

—. (1938). **Memorandum on the Second International Standard Vitamin B_1.**—*Bull. Hlth Org. L. o. N.* **7.** 882–886.

As a result of the production in 1936 of pure vitamin B_1 by artificial synthesis, and following comparative assays carried out in various countries, the Permanent Commission on Biological Standardization of the League of Nations decided that the first international standard preparation, known as the standard adsorption product of vitamin B_1, should now be replaced by the crystalline vitamin B_1 preparation produced by artificial synthesis. This memorandum gives chemical details of the new standard, its form of issue, and indications for its use, together with the precautions to be taken in the preparation of the solution for standardization tests. The international standard preparation is a quantity of pure synthetic crystalline vitamin B_1 hydrochloride (aneurin chloride hydrochloride, or thiamin chloride hydrochloride), stored at the National Institute for Medical Research, Hampstead, London. The international unit is defined as the antineuritic activity of 3 γ of the international standard preparation.—N. J. SCORGIE.

VAN NIEKERK, J., & HOFSTRA, H. (1939). De invloed van dierlijk vitamine-D bij koeien op de antirachitische werkzaamheid van de melk. **[The Influence of Vitamin D of Animal Origin on the Antirachitic Power of Cows' Milk].** —*Tijdschr. Diergeneesk.* **66.** 454–459. 1 table. [15 refs.] [English, French and German summaries].

In a rachitic area a vitamin D preparation of animal origin containing 10,000 international rat units of vitamin D per c.c. was given to six milking cows in doses proportional to their daily milk yield—8 c.c. for 25 litres and 9 c.c. for 28 litres of milk. After three weeks of daily treatment the vitamin D content of the milk was estimated by tests on rachitic rats and the curative action of the milk was compared with that of a standard vitamin D preparation given to similar groups of

rachitic rats. In two experiments it was calculated that the vitamin D content of the milk of the treated cows was 84 and 63 units per litre respectively. It was further calculated that this represented 1·7 % of the vitamin D given to the cows. The normal vitamin D content of the milk of untreated cows was about 20 rat units per litre.—A. W. Möller.

Goettsch, M., & Ritzmann, J. (1939). **The Preventive Effect of Wheat Germ Oils and of α-Tocopherol in Nutritional Muscular Dystrophy of Young Rats.**—*J. Nutrit.* **17.** 371–381. 2 tables. [Numerous refs.]

By administration, during the first five days of pregnancy, of 1 g. of wheat-germ oil to female rats on a vitamin E-deficient diet, it was possible to induce litters which developed muscular dystrophy during the suckling period. [See *V. B.* **10.** 289. It is possible, by the administration shortly after mating of wheat-germ oil, or of vitamin E or a vitamin E concentrate, to prevent the foetal resorption characteristic of pregnant female rats receiving a vitamin E-deficient diet. Suckling rats must receive some source of vitamin E in order to prevent the development of muscular symptoms or lesions; this vitamin E is present in the milk of normal rats, but not in that of rats whose stores of vitamin E have been depleted.] Administration to the young of 300 mg. of wheat-germ oil over a period of ten days, or of a total of 5 mg. of α-tocopherol over 15 days, was found to be sufficient to prevent the appearance of the muscular dystrophy in all but one animal so treated. Wheat-germ oil which had been subjected to ferric chloride treatment, and so rendered inactive as an anti-sterility preparation, was also found to be protective to a considerable degree, administration of a total of 600 mg. preventing the appearance of symptoms or lesions.

Very low concentrations of muscle creatine, of the order of 20–30 mg. per 100 g. fresh tissue, were found in the case of severely affected animals.—A. N. W.

Pappenheimer, A. M. (1939). **The Pathology of Nutritional Muscular Dystrophy in Young Rats.**—*Amer. J. Path.* **15.** 179–183. 8 figs. on 2 plates. [16 refs.]

The pathological changes in the young experimental rats described by Goettsch and Ritzmann [see above] are discussed. Lesions were strictly limited to the voluntary muscles. The muscles were not affected symmetrically, nor were individual muscles always entirely involved.

The appearances varied according to the time that had elapsed since the onset of muscular weakness: at first the muscles were moist and pale, but on the second day they were yellowish-white and opaque, and on the third streaked and gritty. Microscopically there was found to be an initial necrosis with fragmentation of muscle fibres, accompanied by interstitial oedema and infiltration by polymorphs. On the second day, the oedema was resorbed, polymorphs were replaced by mononuclear histiocytes, persisting monocytes showed regenerative activity, multinucleated cell masses surrounded segments of necrotic muscle, and calcification had sometimes begun. In lesions three or four days old, myocytes showed marked regeneration, and though P. has not examined material at a later stage, he considers that complete regeneration ultimately occurs.

Regarding pathogenesis, the view he favours is that of angiospastic occlusion with consequent anoxaemia and infarction.—J. W. Whittick.

Drummond, J. C., Bacharach, A. L., Barrie, Mary M. O., & Browne, F. J. (1939). **Discussion on Vitamin E.**—*Proc. R. Soc. Med.* **32.** 853–864. 2 figs. [Numerous refs.]

The main topics of this discussion were the physiological function of vitamin E, its quantitative estimation, the effects of vitamin E deficiency in the rat, and the

value of vitamin E in human cases of habitual abortion. Observations were cited which strongly suggest that vitamin E plays a role in the normal activity of the anterior pituitary, and an account is given of attempts to elucidate the nature of the relationship, but the results obtained were mainly of a negative character. Further observations on the effects of complete and partial vitamin E deficiency in the rat are described. The necessity of vitamin E for normal embryonic growth in animals other than the rat and mouse has not been established.—W. R. Muir.

PUBLIC HEALTH

Foršek, Z. (1939). Pretraživanje zagrebačkog tržnog mlijeka na zaraženost sa B. abortus Bang. [**Tests of Zagreb Market Milk for Infection with** *Brucella abortus*].—*Jugoslov. vet. glasn.* **19.** 3–18. 6 tables. [Numerous refs.] [German summary].

F. tested 318 samples of market milk from Zagreb and district for the presence of brucella infection, using an agglutination test, g. pig inoculation tests and cultural tests with the media of Stockmayer, Karsten, Lübcke and Huddleson.

Nine samples were found to be infected by the aggl. test, six of these were also positive to the g. pig test and only two of them were positive to the cultural tests. —B. Oswald (Novi, Yugoslavia).

Merchant, I. A. (1939). **Report of the Committee on Communicable Diseases Affecting Man.**—*J. Milk Technol.* **2.** 110–117. 6 tables. [7 refs.]

During 1937, 43 milk-borne epidemics occurred throughout the U.S.A. and 13 epidemics in Canada. Of these, typhoid fever held first place with 15 epidemics causing 11 deaths in the U.S.A. and three outbreaks in Canada causing 13 deaths. The origins of 13 outbreaks were undetermined. Fresh, raw milk was found to be most frequently implicated in the outbreaks. In the few instances where pasteurized milk was involved, investigation revealed that pasteurization was faulty or that contamination occurred after pasteurization.

The complexity of streptococcal milk-borne infections and the difficulty in ascertaining the source of infection is illustrated. The necessity is emphasized for definite identification of the causal streptococcus.

The further education of milk handlers is urged and a copy of the pamphlet distributed to milk handlers by the Connecticut State Department of Health is recorded as part of the report.—F. T. Boyle.

Sevilla, N. S. (1938). **Meat Inspection Work in the City of Manila and Neighboring Municipalities.**—*Philipp. J. anim. Indust.* **5.** 493–500. 2 figs. on 1 plate. [2 refs.]

The present city abattoir at Manila, although not as up-to-date as those in some other countries, has been provided with sanitary facilities for the slaughter of animals and for inspection of the meat. The Bureau of Animal Industry has done much to improve the conditions in the municipal abattoirs and a list of further improvements recommended is given.—F. T. Boyle.

I. Hermansson, K. A. (1939). Aer det vid fall av pleuratuberkulos ur hygienisk synpunkt tillräckligt att enbart avlägsna den tuberkulösa brösthinnan? [**Is It Sufficient for Hygienic Reasons, in Cases of Pleural Tuberculosis, to Remove the Pleura Alone?**].—*Skand. VetTidskr.* **29.** 921–925. [English summary].

II. Brandt, O., & Hülphers, G. (1940). Undersökningar pä förekomst av tuberkelbaciller i kött, revade för serosatuberkulos. [**Occurrence of Tubercle Bacilli in Meat Stripped of Tuberculous Serous Membranes**].—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 508–519. [8 refs.] Discussion p. 519. [English summary].

I. In order to find out whether the muscular tissue lying underneath pleural TB. lesions contains any tubercle bacilli, pieces of the intercostal muscles from 17 cattle affected were inoculated into g. pigs. G. pigs inoculated from 13 cases became infected with TB. Such tissues ought, therefore, to be condemned at meat inspection.

II. A similar investigation was made on 39 cases of pleural and 22 cases of peritoneal TB. The underlying muscular tissue was found infected in 23 (59%) and 12 (54%) of the cases respectively.

[It is assumed in both these papers that infection of the sub-serous tissues took place during the stripping away of the diseases membranes and not *antemortem*.]—J. E.

Haines, R. B., & Scott, W. J. (1940). **An Aerobic Organism Associated with " Bone-Taint " in Beef.**—*J. Hyg., Camb.* **40.** 154–161. 6 figs. on 1 plate, 2 tables. [8 refs.]

From the hip joint of a case of " bone-taint ", a *Clostridium* was isolated which was non-pathogenic to laboratory animals and not a toxin producer. The organism somewhat resembled *Cl. oedematiens*.—F. T. Boyle.

THERAPEUTICS

Ingersoll, R. L., Winn, Mildred, & Lindegren, C. C. (1939). **Crotonaldehyde in Experimental Tuberculosis.**—*Amer. Rev. Tuberc.* **40.** 169–174. 2 figs., 3 tables. [5 refs.]

G. pigs were artificially inoculated with tuberculosis and then some were exposed daily to the vapour of croton aldehyde. Fewer and smaller tubercles developed in the treated animals than in the untreated control g. pigs.—J. M. R.

Feldman, W. H., & Hinshaw, H. C. (1940). **Sulfapyridine in Experimental Tuberculosis. The Pathology of Experimental Tuberculosis and of Apparent Toxic Changes in Guinea Pigs Treated with Sulfapyridine.**—*Amer. Rev. Tuberc.* **41.** 732–750. 9 figs., 2 tables. [12 refs.] [Authors' conclusions copied *verbatim*].

1. Sulfapyridine exerted a definite modification and retardation of the expected course and character of the disease in animals receiving the drug.

2. The effects of the drug were most noticeable in the character and extent of the disease in the spleen and axillary lymph nodes.

3. Nephrotoxic effects of the drug were not observed.

4. In several instances grave and extensive changes occurred in the mucosa of the digestive tract which presumably were produced by sulfapyridine.

5. Although certain desirable modifications in the character of the tuberculosis occurred in most of the guinea pigs that were treated, the results do not imply that sulfapyridine would be of value in the clinical treatment of tuberculosis.

I. Klein, L. A., Kleckner, A. L., & Parry, R. M. (1939). **Reaction of the Cow to Sulphanilamide and its Effect on Mastitis Streptococci and Staphylococci.**—*Vet. Ext. Quart. Univ. Pa.* **39.** No. 75. 3–21. 1 table. [7 refs.]

II. Miller, W. T., Murdock, F. M., & Heishman, J. O. (1939). **Second Report on the Use of Large Doses of Sulfanilamide in the Treatment of Chronic Streptococcal Mastitis.**—*J. Amer. vet. med. Ass.* **95.** 140–145. 5 tables. [6 refs.] [See *V. B.* **9.** 734].

Twenty-one cows, 17 with streptococcal mastitis, 1 with a staphylococcal type and 3 with mixed types, were given sulphanilamide daily in doses of 6–10 g. per 100 lb. body weight over a period of 10–14 days. This dosage was based on evidence obtained in a preliminary experiment on 8 cows, and was found to give a concentration of 4–10 mg. of the drug per 100 c.c. of blood and milk. After treatment, only 3 cows were entirely clear of infection, 2 of the streptococcal cases and the one staphylococcal case. Of 42 streptococcal quarters, however, 4 became free of infection, and of 8 staphylococcal quarters, 7 were cleared up. The administration of the drug caused certain undesirable effects such as diarrhoea, constipation, decreased milk yield, salivation, skin reaction (scab formation on thin skinned parts), pyrexia, etc., but the animals soon returned to normal when the dosage was stopped. There was no apparent effect on the R.B.C. or haemoglobin contents of the blood, but there was a fall in the white cell count during the experiment. The effect of administering sodium bicarbonate and magnesium sulphate to cows along with sulphanilamide was tested and no additional toxic effects were noted.

II. Three cows affected with chronic streptococcal mastitis were given sulphanilamide in initial doses of 0·4 g. per kg. body weight, followed by 0·2 g. per kg. every twelve hours to make up six doses. On account of a tendency for the drug to accumulate in the blood and milk, the amount was then reduced to 0·15 g. per kg. for two doses and then to 0·1 g. per kg. for the final three doses. This dosage gave a concentration of 20 mg. of sulphanilamide per 100 c.c. of blood and milk over the six days. A temporary disappearance of streptococci from the milk occurred during treatment in all three, but the organisms reappeared as soon as all traces of the drug had left the blood and milk. The authors consider that sulphanilamide can be of little value in the treatment of chronic streptococcal mastitis, but in view of the transient inhibitory effect of the drug on the organisms they suggest that it might be of use in the treatment of acute streptococcal mastitis in that it might hasten the resolution of the clinical syndrome. Beyond a temporary decrease (20–38%) in the milk production and some loss in weight, no ill effects were observed as a result of the treatment.—Hugh N. Spears.

Smith, J. A. (1940). **Local Treatment with Prontosil Soluble.**—*Brit. med. J.* June 22nd. 1016–1017. [7 refs.] [Author's summary copied *verbatim*].

Successful local treatment with prontosil soluble in empyema, ulcers, abscesses, and other conditions is described. The drug has anti-bacterial, deodorant, and stimulating action in such cases, and toxic effects do not occur.

Colebrook, L., & Maxted, W. R. (1940). **Streptococcal Infections in Mice Treated by Chemotherapy and Serum.**—*Lancet.* **238.** 21–23. 3 tables. [3 refs.]

Mice were injected with haemolytic streptococci and some hours later received a single large dose of sulphanilamide, with or without a subeffective dose of homologous immune serum. Of 42 mice receiving the combined treatment 26 survived; of 42 mice receiving sulphanilamide alone 18 survived. The survival rate was about the same when the sulphanilamide (or sulphapyridine in two cases) was given in repeated small doses, with or without serum. The addition of immune serum plus sulphanilamide to normal human blood *in vitro* conferred on it considerable bactericidal power to haemolytic streptococci, whereas a similar addition

of each agent separately enabled the blood to exert only a slight bacteriostatic effect. The treatment of human streptococcal infections with serum plus a chemotherapeutic agent is not at present advocated.—J. M. Robson.

I. Wolff, L. K., & Julius, H. W. (1939). Action du sulfanilamide *in vitro* et *in vivo*. [**Action of Sulphanilamide** *in vitro* **and** *in vivo*].—*Ann. Inst. Pasteur.* **62.** 616–651. 16 figs., 7 tables. [Numerous refs.]

II. Bürgers, J. (1939). Ueber den Wirkungsmechanismus von Prontosil und ähnlichen Substanzen. [**Mode of Action of Prontosil and Similar Substances**].—*Zbl. Bakt. I.* (*Orig.*). **144.** *223–*227. 2 tables.

I. By using a technique allowing of the accurate measurement of the growth curve of bacteria *in vitro*, the authors have found that the action of sulphanilamide is exerted essentially on the reproduction of the bacteria. If the growth of bacteria is slow the action of sulphanilamide is not apparent, but in a rapidly growing culture multiplication is inhibited by sulphanilamide. Optimum conditions for the demonstration of the action of sulphanilamide are present when the bacteria reproduce themselves about eight times within a short period of time. Sulphanilamide is thus not an antiseptic and acts in a manner entirely different from, *e.g.*, phenol and trypaflavine. Concentrations of sulphanilamide 100 times greater than those necessary to produce an anti-bacterial effect, have no toxic effect on the cells of higher organisms, and do not affect phagocytosis. After the reproduction of bacteria has been arrested by sulphanilamide the infection is then dealt with by the natural defences of the organism. It is thus rational to help these natural defences in any manner possible, *e.g.* by the administration of antisera.

II. The *in vitro* experiments performed so far offer no satisfactory explanation for the mode of action of the sulphonamide drugs. Phenomena not observed *in vitro* include inhibition of growth which varies with different strains of streptococci, an inhibition in the production of toxin, the rapid appearance of phagocytes and the increase in the phagocytic activity of the leucocytes.—J. M. Robson.

Clark, A. J. (1940). **The Fate in the Body of Sulphapyridine.**—*Edinb. med. J.* **47.** 241–249. 2 figs., 1 table. [8 refs.]

Tunnicliff, Ruth. (1940). **Effect of Sulfapyridine on Phagocytosis and Dissociation.**—*J. infect. Dis.* **66.** 148–152. 1 table. [11 refs.]

Henderson, D. W., & Gorer, P. A. (1940). **The Treatment of Certain Experimental Anaerobic Infections with Sulphapyridine and with Immune Sera and the Problem of Synergic Action.**—*J. Hyg., Camb.* **40.** 345–364. 8 tables. [17 refs.]

I. Sulphapyridine is absorbed rather more slowly than alcohol; it is distributed throughout about three-quarters of the body volume, but this volume of distribution may vary from one-half to nearly the whole of the body volume. Sulphapyridine is removed partly by acetylation by the liver, and partly by excretion by the kidney. Both these processes appear to follow an exponential course, *i.e.*, a constant proportion of the drug present is removed per unit of time. The acetylated drug is excreted about three times as rapidly as is the free drug; the removal is therefore dependent almost equally on the activity of the liver and of the kidneys. There is very wide individual variation in the ratio of acetylation. The therapeutic action of the drug is probably proportional to the blood concentration of free drug. It is generally agreed that the acetylated drug is toxic and therapeutically inert. If a definite relation could be demonstrated between the blood concentration of acetylated drug and the incidence of toxic effects, this would indicate profitable lines of research on methods for reducing the latter.

II. Sulphapyridine (1:1,000–1:100,000) in saline promotes phagocytosis of greening streptococci, staphylococci and non-encapsulated pneumococci. It stimulates the activity of leucocytes if serum is present, but does not act as opsonin. Streptococci and pneumococci grown in 1:1,000 sulphapyridine plain broth show some S → R dissociation which makes the organisms more phagocytable than an equal number in the S phase. 1 c.c. of 1:1,000 sulphapyridine solution injected subcutaneously into mice prevents abscess formation by staphylococci injected intraperitoneally. Smear preparations from the peritoneal cavity of mice injected with staphylococci with and without sulphapyridine, indicate that, beginning one hour after sulphapyridine is given, staphylococci are removed from the peritoneal cavity by phagocytosis.

III. Sulphapyridine is a good prophylactic or therapeutic agent against intradermal infection with a strain of *Clostridium septique*, but is unreliable against intramuscular infection. The drug produces some prophylactic action against intradermal infection with a strain of *Cl. welchii* (Type A). There is no evidence that sulphapyridine given by mouth neutralizes the toxins of *Cl. septique* or *Cl. welchii* injected intravenously. In intradermal and intramuscular injection with *Cl. septique* the combined action of sulphapyridine and antitoxin, or of the drug and anti-bacterial serum, effects a saving in life much greater than would be expected if a mere summation effect were in question. In *Cl. welchii* infections the combined action of antitoxin and sulphapyridine produces a noticeable synergic effect, but the evidence on this point is less clear.—J. M. Robson.

Osgood, E. E., & Brownlee, Inez F. (1938). **Culture of Human Marrow. Studies on the Mode of Action of Sulphanilamide.**—*J. Amer. med. Ass.* **110.** 349–356. 4 figs., 2 tables. [Numerous refs.]

The authors utilized cultures containing human bone-marrow for study of the action of sulphanilamide on β-haemolytic streptococci. They concluded that the chief actions of the drug are to neutralize or destroy the toxins, and to cause a decrease in the rate of division of the streptococci; that sulphanilamide itself does not kill the streptococci, but does permit the bactericidal action of human serum and phagocytosis by the blood cells to overcome the infection, and that it is effective in a dilution of 1:100,000.

They recommend the use of this type of experiment for work on other drugs and other organisms since the action on the living cells can be directly observed. They also recommend the addition of 1:100,000 sulphanilamide to various types of tissue culture, as it reduces the danger of bacterial contamination, without altering markedly the growth characteristics of the cells.

I. Domagk, G. (1937). Untersuchungen über den Wirkungsmechanismus des Prontosil bei der experimentellen Streptokokkeninfektion. [**Mode of Action of Prontosil in Experimental Streptococcal Infection**].—*Z. klin. Med.* **132.** 775–801. 16 figs. [Numerous refs.]

II. Rich, A. R., & Follis, R. H., Jr. (1938). **The Inhibitory Effect of Sulfanilamide on the Development of Experimental Tuberculosis in the Guinea Pig.**—*Johns Hopk. Hosp. Bull.* **62.** 77–84. 2 figs. on 1 plate. [11 refs.]

III. Anon., (1938). **The Mechanism of the New Chemotherapy.**—*Brit. med. J.* March 5th. 522–523. [8 refs.]

I. Prontosil does not act by a general stimulation of the reticulo-endothelial system: this would not explain the specificity of its action. Degenerative changes in the streptococci suggest that the drug, or a decomposition product, has a direct

action on the organisms. But no degenerative changes are observed in streptococci treated with prontosil *in vitro*, suggesting that the body tissues and cells play an important part in the defensive mechanism. Reduction to sulphanilamide cannot be the only explanation, since certain effective compounds, *e.g.* 4-benzylamino-benzolsulphonamide, are excreted unchanged in the urine. It is suggested that the bacteria and certain tissue cells may play a part in the changes which substances of the sulphonamide group undergo in the body. Many questions still require further investigation.

II. Sulphanilamide exerted a striking inhibitory effect upon the development of tuberculosis induced by the human type of bacillus in guinea pigs ; in none of the animals, however, did the drug completely prevent the growth of the bacilli.

III. There is much evidence that the sulphonamide drugs do not produce their action by a direct bactericidal effect, but their mode of action is as yet unknown. DOMAGK [see I] believes that prontosil makes streptococci susceptible to attack by the normal bodily defences. LEVADITI [(1937). *Monographes de l'Institut Alfred Fournier.* No. 5. Paris.] asserts that the drugs are converted, probably by the reticulo-endothelial system, into some other and more active substance. BUTTLE [(1937). *Proc. roy. Soc. Med.* **31.** 154.] has obtained evidence showing that there are two effects—one purely bacteriostatic and one opsonic in type. OSGOOD and BROWNLEE [see preceding abstract] have concluded that sulphanilamide neutralizes streptococcus toxins.—J. M. ROBSON.

I. VOLKOVA, A. A. (1938). Opyt khimioterapii brutselleza ovets. [**Chemotherapeutic Treatment of Ovine Brucellosis with Rivanol**].—*Trud. Uzbek. nauchn.-issled. vet. Stan., Tashkent.* **9.** 27–38.

II. KULAKOV, K. A. (1938). Izmeneniya v organakh ovets, zarazhennykh Brucella melitensis i lechennykh rivanolem. [**Histological Changes in *Brucella melitensis* Infected Sheep Treated with Rivanol**].—*Ibid.* 39–47. 1 fig., 3 tables. [7 refs.] [English summary].

I. Rivanol was found by V. to be ineffective as a remedy for *Br. melitensis* infection in sheep.

II. A description of the P.M. findings in the sheep used for the above experiments.—E. MARTIN.

KRANEVELD, F. C., & DJAENOEDIN, R. (1938). Experimenten betreffende de prophylactische behandeling van surra met naganol. [**Prevention of Surra by Naganol**].—*Ned.-ind. Bl. Diergeneesk.* **50.** 262–282. 1 table. [English and German summaries].

In various parts of the Dutch East Indies horses are injected prophylactically with one dose of 1 g. of naganol to prevent surra. The authors suggest that this method may result in the forming of naganol-fast strains, *e.g.* when infected horses whose blood at the time of examination is negative are given a sub-therapeutic dose ; the same point arises with regard to buffaloes given 3 g. as a prophylactic measure.

In studying this problem 24 horses were infected artificially and then given 1 g. of naganol, the treatment being repeated once or more. Finally, the usual therapeutic treatment was given, 3 g. of naganol and 3 g. of arsocoll. Four of the 24 horses relapsed ; it is suggested that this could perhaps be considered to point to some naganol resistance, but after a second therapeutic treatment these four animals were definitely cured. The chance that naganol-fast strains may be formed to such an extent that they may be a danger in practice is considered to be very slight. The experiments with buffaloes could not be judged as all infected

animals recovered directly after the prophylactic dose of 3 g. of naganol, so that the forming of naganol-fast strains could therefore not be studied.

—JAC. JANSEN (UTRECHT).

VAN SACEGHEM, R. (1939). Le surfen C ou congasine. [**Surfen C or Congasine**]. —*Ann. Soc. belge Méd. trop.* **19.** 601–602. [2 refs.]

Reports from different countries indicate that a great difference of opinion exists as to the value of Surfen C in the treatment of *Trypanosoma congolense* infection, and it has been suggested that samples of the drug may vary in their composition. The author considers that good results may only be obtained when infection is due to a mild strain of the trypanosome, and records that the infection in Ruanda is steadily decreasing in virulence. He suggests that strains of *Tryp. congolense* or *Tryp. vivax* transmitted by tsetse fly are virulent, but when a strain is passaged mechanically by other biting flies the virulence decreases, and infection becomes more amenable to Surfen C treatment.—U. F. RICHARDSON.

STEWART, J. L. (1939). **Treatment of *Trypanosoma brucei* Infection in Horses.** —*J. comp. Path.* **52.** 316–317. [2 refs.]

Tryp. brucei infection of horses in the Gold Coast is virulent and recoveries are rare. The successful treatment of two horses by injections of antimosan and naganol or antrypol is described. 4 g. doses of naganol and also 3 g. doses of antrypol produced toxic symptoms. It is intended to treat future cases with antimosan combined with very small doses of naganol.—S. J. GILBERT.

KIKUTH, W., & MUDROW, Lily. (1939). Chemotherapeutische und immunbiologische Studien bei der Piroplasmose des Hundes (B. canis). [**Chemotherapy and Immunology of Canine Babesiasis**].—*Z. ImmunForsch.* **96.** 125–141. [8 refs.]

In experimental cases of *B. canis* infection, treated early, complete cure was obtained with acaprin given in doses of 0·25 mg. per kg. body weight intravenously, 0·5 mg. per kg. intramuscularly and 20 mg. per kg. orally, the concentration of the drug having no influence on the result. The animals could be reinfected with the same strain of the organism within three weeks of treatment.

Parasitic sterilization with these doses was only obtained in experimental cases treated very early, and after dogs had been reinfected and cured twice, further reinfection was not sterilizable by acaprin treatment. It is suggested that this failure of acaprin to sterilize in chronic cases cannot be due to drug fastness, since, if a new dog is infected from the one under experiment, early infections again yield to treatment.

Animals eventually become immune to reinfection, but whilst in some cases parasites cannot be demonstrated microscopically or by subinoculation or splenectomy, in other cases the blood may remain infective for long periods, and in one case a relapse following splenectomy is recorded three years after infection.

The sera of immune dogs, whether parasite-free or latent carriers, does not contain any demonstrable protective antibody, and it is argued that the immune state must be due to a cellular reaction.—U. F. RICHARDSON.

PECK, E. F. (1939). **Salt Intake in Relation to Cutaneous Necrosis and Arthritis of One-Humped Camels** (*Camelus dromedarius*, L.) **in British Somaliland.** —*Vet. Rec.* **51.** 1355–1360. 1 graph. [7 refs.]

P. reports a disease [" Jhooling "] characterized by multiple localized necrotic

areas of the skin in camels of the Somaliland Corps ; 7 % of the total animals were affected. The diet included 1 oz. rough salt daily and it was found that by increasing this quantity to about 5 oz. the disease could be prevented and, in conjunction with local treatment, be cured. At the same time, the general appearance of the camels improved by the reappearance of a " bloom " on their coats. A small, independent feeding experiment with a synthetic mineral mixture showed that the general ration was not, by any means, deficient in Fe, I, Ca, P, or vitamin D. Cases of arthritic lameness of unknown causation also disappeared when the extra allowance of salt was given.

The native-owned Somali camel requires salt sand, salt bush (*Salsola* spp.) or salt water every six months to prevent the necrotic contagious condition of the skin. The salt sand consists essentially of calcareous soil impregnated with various soluble salts, the chief amongst which are Na_2SO_4 and NaCl.

The most effective form of treatment for the skin necrosis was found to be cauterization of the lesion with pure phenol, followed by the application of 4 % saline packs. Although occasional animals develop boils and abscesses, the lesions do not show the virulent contagious nature of the original condition. Cases of arthritic lameness of unknown causation also disappeared when the extra allowance of salt was given, and no new cases have appeared for two years.—A. Eden.

Eden, A., & Green, H. H. (1939). **The Fate of Copper in the Blood Stream.**—*J. comp. Path.* **52.** 301–315. 2 figs.

After intravenous injection of $CuSO_4$ into rabbits and sheep the immediate rise of blood Cu was followed by rapid distribution over the tissues and almost normal values were again approached within five hours of a non-fatal injection. The Cu content of cells and plasma in normal blood of cattle and sheep was found to be approximately the same. After intravenous injection of $CuSO_4$ the plasma level was at first higher than that of whole blood and the rate of disappearance from the plasma was also higher. After equilibrium was established between corpuscles and plasma the rate of disappearance was much the same for both. With large doses, however, raising blood Cu to very high levels, the rate of fall for plasma was at first faster and afterwards slower than for whole blood. Copper, it is stated, appears to penetrate the corpuscles or be adsorbed on the corpuscular membrane and thereafter to be somewhat tenaciously retained. When toxic or sub-toxic doses of $CuSO_4$ were given in solution by stomach tube the blood Cu value rose to levels representing the balance between rate of absorption into the blood and rate of disappearance from it, relatively high maxima being reached within a few hours. No significant rise occurred when the solution was previously dried on food. In cases of acute poisoning after oral administration, the physiological effects of a high blood Cu level were superimposed upon those of a gastro-enteritis. The authors indicate that the upper level of blood Cu not attended by fatal sequelae appears to lie between 1·2 and 1·6 mg. %, or about ten times the normal for the rabbit and somewhat lower for the sheep.

There was no appreciable rise in blood Cu of sheep dosed orally with the anthelmintic dose of 1 % $CuSO_4$ solution, and a slight rise only was associated with twice this amount. The absence of rise in blood Cu after therapeutic dosing is against the current opinion that the parasiticidal effect is exerted *via* the blood of the host. The authors consider that the damage to the parasites (*Haemonchus contortus*) is probably either a contact effect or a transference of Cu in high concentration along the channel of penetration of sucking parts into the capillaries.

—N. J. Scorgie.

BREWER, G. (1940). **A Statistical Study of Cobalt Polycythemia in the Dog.**—*Amer. J. Physiol.* **128.** 345–348. 3 tables. [6 refs.]

From a statistical study of attempted induction of Co polycythaemia in dogs, it is concluded that 2 mg. Co per kg. body weight per day cause no significant increase in erythrocyte number or in Hb percentage, and that doses exceeding 5 mg. daily are necessary before the Hb concentration is increased. This figure of 5 mg. Co per kg. seems to be close to the critical concentration required to increase the number of cells and Hb level significantly, and still larger doses are necessary before the cell volume is increased.—ALFRED EDEN.

KIDSON, E. B., & MAUNSELL, P. W. (1939). **The Effect of Cobalt Compounds on the Cobalt Content of Supplementary Fodder Crops.**—*N.Z. J. Sci. Tech.* **21.** 125A–128A. 2 tables. [3 refs.]

The cobalt content of turnips, swedes, rape and oats, grown on country considered to be low in that element was significantly increased by the use of cobaltized superphosphate. This agrees with previous observations on the effect of cobaltized superphosphate on pasture plants.—LEWIS FITCH.

BANDEMER, Selma L., DAVIDSON, J. A., & SCHAIBLE, P. J. (1940). **Availability of Manganese in Natural and Precipitated Manganese Carbonate.**—*Poult. Sci.* **19.** 116–125. 6 figs., 5 tables. [6 refs.]

Feeding experiments were conducted to evaluate the relative perosis-preventing capacities of natural (rhodochrosite) and precipitated $MnCO_3$. Parallel equilibration experiments were carried out *in vitro* in water or N/10 HCL, with and without the ration. Precipitated $MnCO_3$ prevented perosis at 30 p.p.m. Mn., but fine rhodochrosite (passed through no. 300 sieve) at levels of 30, 50, 75, 100 and 125 p.p.m. was unsatisfactory. On equilibration with acid the amount of soluble Mn in rations containing the ore was much less than in those supplemented with precipitated carbonate. It was demonstrated that the solubility of the ore increased with time, temperature and decrease in particle size, but that the rate of solution was not as great as that of precipitated $MnCO_3$. Excess of certain mineral supplements which are known to be perosis-producing decreased the soluble Mn from both carbonates, but the reduction was more pronounced with the ore. Rhodochrosite either roasted or dissolved in acid was effective in preventing perosis, indicating that the Mn was satisfactory if available to the chick and that the extraneous material *per se* was not harmful. Precipitated $MnCO_3$ with additions of known impurities of the ore was also equally effective. It is concluded that whatever the reason for the insolubility of the rhodochrosite, it is not a satisfactory supplement for chicks.

Methods for the determination of Mn and the differentiation of rhodochrosite from precipitated $MnCO_3$ are given.—R. ALLCROFT.

ACHARYA, S. K. (1939). **Experimental Treatment of Helminth Parasitic Infection of Poultry with Colloidal Iodine or Iodine Vermicide.**—*Indian vet. J.* **16.** 83–93. 6 tables.

Successful results following the administration of colloidal iodine *per os* directly into the gizzard during an outbreak of helminthiasis in poultry, are recorded. The drug was employed as a 10% solution in water. Birds over 4 lb. body weight received one ounce, and birds under 4 lb., half an ounce of the solution. No fasting was necessary, and no purgative was required.

The treatment was administered to 70 birds, and proved largely effective against *Ascaridia lineata*, *Raillietina tetragona*, and *Cotugnia digonopora*. A marked

improvement in condition of all treated birds was noted. There were no symptoms of toxicity.—D. D. Ogilvie.

POISONS AND POISONING

Moxon, A. L., Schaefer, A. E., Lardy, H. A., Dubois, K. P., & Olson, O. E. (1940). **Increasing the Rate of Excretion of Selenium from Selenized Animals by the Administration of *p*-Bromobenzine. [Correspondence].**—*J. biol. Chem.* **132.** 785–786. [1 ref.]

Experiments were conducted on dogs fed a diet containing 10 p.p.m. Se and on steers grazing on a seleniferous range. By the administration of *p*-bromobenzene, the blood Se level was reduced and the urinary Se level was increased. The drug appears to aid the organism in excreting Se by taking it from the proteins of the blood and tissues and excreting it possibly as Se-cystine and methionine compounds which are conjugated with the *p*-bromobenzene and excreted as the mercapturic acids.—Alfred Eden.

Phillipe. (1939). A propos de la toxicité de l'atoxyl pour les volailles. **[Toxicity of Atoxyl for Poultry].**—*Bull. Serv. zootech. Epiz. A.O.F.* **2.** No. 4. 8–9.

Occurrences of poisoning in fowls, treated subcutaneously with 0·1 g. atoxyl for spirochaetosis, led to an investigation of the toxicity of atoxyl. This compound under tropical conditions appears to be very susceptible to decomposition into substances more toxic than the parent compound. A dose of 0·1 g. of a fresh product seemed to be about the maximum safe dose that fowls can tolerate, but 0·05 g. was perfectly safe while giving excellent therapeutic results.—Alfred Eden.

I. Danckwortt, P. W. (1939). Tiervergiftungen durch Fabrikabgase. **[Animal Poisoning by Industrial Waste Gases].**—*Dtsch. tierärztl. Wschr.* **47.** 277–279. [11 refs.]

II. Wiemann. (1939). Kupfervergiftungen durch Hüttenrauch. **[Copper Poisoning Caused by Factory Fumes].**—*Ibid.* 279–281. [3 refs.]

III. Lütje. (1939). Nochmals über Kupfervergiftungen bei Weidetieren. **[Copper Poisoning in Ruminants].**—*Ibid.* 372–375. [16 refs.]

IV. Bischoff, O., & Haun, F. (1939). Vergiftungen durch kupfer- und arsenhaltigen Flugstaub bei Haustieren. **[Poisoning of Domestic Animals by Chimney Smoke Containing Copper and Arsenic].**—*Ibid.* 442–447. 2 tables. [8 refs.]

I. Discusses the commoner noxious constituents of factory flue gases. Sulphurous and sulphuric acids, hydrochloric acid, chlorine, sulphuretted hydrogen, nitrous gases, ammonia, and fluorine compounds may occur. Although these may cause " smoke damage " in the general sense, they rarely, with the exception of fluorine, cause animal poisoning. At one time arsenic was a serious factor in the Freiberg area, but the danger is now almost entirely eliminated by processes for cleansing flue gases. The damage formerly done by arsenic in Montana, North America, is also quoted, where in the year 1902 over a quarter of a million dollars was paid in compensation for animal losses. Lead contamination of pastures and hay has been reported in recent years from the Veterinary Institute in Hanover. Copper contamination is occasionally reported. Gastro-intestinal disturbance in cattle has been attributed to excessive iron contamination of pasture, but on inadequate evidence.

II. A disused copper works was brought into operation under a new process in Autumn, 1937. By May 1938 increasing smoke damage to vegetation was

reported, and six weeks after turning cows out to grass illnesses were reported on pastures contaminated with yellowish red dust in the direction of the prevailing wind from the chimneys. Symptoms of constipation were followed by diarrhoea, loss of appetite, reduction of milk yield, emaciation, thickening of the skin, loss of hair, abortion, death of foetus *in utero*, and cessation of oestrus. 600 animals or 25 % of the cattle population of the area, were badly affected ; of these, 40 died and 460 had to be slaughtered. P.M. revealed enteritis in acute cases, but nothing noteworthy in chronic cases beyond incipient fatty degeneration of the liver, the copper content of which was abnormally high. The outbreak was considered to be one of chronic copper poisoning, possibly associated with arsenical poisoning in lesser degree.

III. Discusses acute and chronic copper poisoning in cattle, sheep and goats, with particular reference to contamination of orchards by spraying fruit trees with copper compounds, and records observations in apple orchards in which chronic poisoning developed from several weeks up to four months after spraying. Experiments of Ellenberger and Baum are quoted to show that in sheep about 4 g. of copper sulphate are required to produce acute intoxication but that lesser quantities such as 0·5 g.–1 g. per day can be tolerated for long periods. One sheep ingested 89 g. over 52 days and another 182 g. over 132 days before succumbing to chronic poisoning. A third received 50 g. over 47 days, but although administration then ceased the sheep died about five weeks later. Symptoms in chronic cases are dermatitis, oedema of the ears, loss of wool, sexual dysfunction, icterus, nephritis and fatty degeneration of the liver.

IV. Discusses extensive copper poisoning in animals occurring in Westphalia in 1938, from deposition of copperized dust on pastures from chimney gases of a copper factory. Horses, cattle, sheep and goats were affected. Livers of affected sheep showed 60–250 mg. Cu per kg. of fresh tissue, as against 9–29 mg. for normal sheep taken for comparison. Outstanding symptoms were lachrymation, loss of condition, diminution of milk flow, leathery condition of skin, digestive disturbances, sterility, abortion and retention of afterbirth. At P.M., enlargement of the liver was almost always observed. The flue dust contained 2·5 % of copper, with 23 mg. arsenic per kg., but no lead. The cause of the outbreak was accepted as a combination of chronic copper poisoning and arsenical poisoning. As an interesting side-light may be mentioned the fact that despite the higher copper content of the organs of affected animals, stomach worms and lung worms were frequently present.—H. H. Green.

Aĭkashev, D. E., & Dubovik, N. M. (1938). Tribulez ovets i koz v ashkhabadskom raïone TSSR. [**Poisoning with *Tribulus terrestris* in Sheep and Goats in the Ashkhabad Region of Tadzhikistan**].—*Trud. Uzbek. nauchn.-issled. vet. Stan., Tashkent.* **9.** 105–108. [English summary].

An account of the occurrence of *Tribulus terrestris* poisoning (including photosensitization) in Turkmenia. The symptomatology is described. No new facts are recorded.—E. Martin.

I & II. Steyn, D. G. (1937). **Recent Investigations into the Toxicity of Known and Unknown Poisonous Plants in the Union of South Africa. VII and VIII.**—*Onderstepoort J. vet. Sci.* **9.** 111–124 and 573–582. [13 refs.] [For previous parts, see *V. B.* **5.** 455 ; **6.** 270, and **8.** 179].

I. Of 18 suspected poisonous plants tested biologically, *Pergularia gariepensis* N.E.Br. and *Ornithogalum calcicola* were discovered to be poisonous. The

alkaloids, isatidine and retrorsine, were administered orally to horses with negative results. Large amounts of hydrocyanic acid were detectable in *Dimorphotheca nudicaulis* DC.

II. Biological and chemical tests were conducted with 14 different plants. Hydrocyanic acid was detected in specimens of wilted *Medicago sativa* L. (lucerne, alfalfa), *Tephrosia macropoda* E. Mey (fish poison), and *Atriplex semibaccata* R. Br. (creeping salt bush), whilst the fresh plants yielded negative results. *Acalypha indica* L. contains a cyanogenetic glucoside and has been proved to be a deadly poison. A prominent symptom was an intense, dark chocolate-brown discoloration of the blood. An unidentified species of *Urginea* caused transient symptoms of poisoning in a sheep. The following plants induced no symptoms of poisoning in experimental animals :– *Crassula expansa* Ait., *Melica decumbens* Thunb., *Canavalia ensiformis* DC., *Ornithogalum Pretoriense* Bkr., *Argemone Mexicana* L., and *Rumex ecklonianus* Meisn.

PHYSIOLOGY

FRICS, L. (1939). Szarvasmarha, borjú és szarvasmarhamagzat májának és tüdejének vastartalma. [**Iron Content of the Liver and Lungs of Adult Cattle, Calves and the Bovine Foetus**].—*Thesis, Budapest.* pp. 20. 5 tables. [Numerous refs.]

F. established the total iron content, the haemoglobin-bound iron content and the free iron content in liver, spleen and lungs of ten adults, ten calves and ten foetuses.

It was found that the total iron content of the lungs and liver, but not of the spleen, increased with age. Blood-bound iron content was highest in the liver of calves and in the lungs and spleen of adults. The highest values for free iron were found in the liver and spleen of adults and the lungs of calves.—E. MARTIN.

HORVÁTH, I. (1938). A szemlencse, csarnokvíz és az üvegtest fehérjetartalma egészséges és beteg szemű lovakban. [**The Protein Content of the Crystalline Lens, Aqueous Humour and Vitreous Body in Healthy and Diseased Eyes of Horses**].—*Thesis, Budapest.* pp. 14. 4 tables. [Numerous refs.] [German summary].

H. determined the protein content of the aqueous humour, lens, and vitreous body in 60 normal and 60 diseased eyes of horses.

The average protein content of lenses of the eyes of horses aged 12–18 years was 38 %, and of horses aged 6–8 years, 41 %. The aqueous humour contained 0·06 % and the vitreous body 0·05 % protein in the older and 0·07 % and 0·05 % respectively in the younger age groups.

The protein content of diseased eyes was found to be greater than that of healthy ones. The average figures for slightly affected eyes were 50 % in the lens, 0·1 % in the aqueous humour and 0·08 % in the vitreous body. For seriously affected eyes the respective figures were 31·9 %, 0·402 % and 0·9 %. [No indication is given of the nature of the abnormalities in the diseased eyes.]—E. MARTIN.

HARRISON, Helen C., & LONG, C. N. H. (1940). **The Distribution of Ketone Bodies in Tissues.**—*J. biol. Chem.* **133.** 209–218. 3 tables. [16 refs.] Discussion pp. 215–217.

Determinations of the concentrations of ketone bodies in whole blood, liver, muscle, plasma water, liver cell water and muscle cell water were made after

producing an endogenous ketosis in rats by fasting after a stock diet, injection of anterior pituitary extract, injection of phloridzin and fasting after a high fat diet; an experimental ketosis was also produced by the injection of β-hydroxybutyric acid. The results show that rat liver and muscle tissues differ considerably with respect to their metabolism of β-hydroxybutyric and acetoacetic acid. In all cases of ketosis an increased concentration of ketone bodies was found in the liver cell water, but appreciable amounts of ketones were not found in muscle cell water until the concentration in the plasma was elevated to about 70–80 mg. per 100 c.c. Above this level, as the concentration in the plasma increases, the amount in the muscle cell also increases.

It is suggested that the evidence indicates that the ketogenic effects of fasting, anterior pituitary extract and phloridzin are due to their action upon the metabolism of the liver cell, as a result of which there is an increased ketone body production. The utilization of ketones by the muscle cell is also deduced from the results.

—R. Allcroft.

Stewart, J., & Holman, H. H. (1940). **The "Blood Picture" of the Horse.**—*Vet. Rec.* **52.** 157–165. 2 figs., 2 tables. [13 refs.]

The authors studied the normal range of values of a number of cellular and chemical constituents of the blood in horses. Their subjects were in two classes, (1) 36 Clydesdale horses in work but fed on pasture, and (2) 26 horses of mixed types either extremely aged or disabled. These latter horses were stable fed and not working.

Among the constituents studied were:– red and white blood corpuscles, platelets, differential leucocyte counts, coagulation times, fragility of red corpuscles, and packed cell volume. The following chemical constituents were estimated:– haemoglobin, chlorides, inorganic and total phosphorus, sugar, non-protein nitrogen, amino-nitrogen, calcium, potassium, sodium and magnesium.

It was found that the numbers of red blood cells and the packed cell volume were higher in the second group of horses than in the first group. The haemoglobin values were correspondingly higher. One or two horses were responsible for extreme ranges of some chemical constituents, although clinically they appeared normal. The authors consider that Neser's theory that the red cell count is influenced by the rate of the circulation, is probably correct. These are difficulties that must be borne in mind in studying normal blood pictures.

Full details of the techniques employed are given, and the numerical findings are well tabulated. The article should be consulted by all interested in normal haematological values.—D. L. Hughes.

I. Carmichael, J., & Jones, E. R. (1939). **The Cerebrospinal Fluid in the Bovine: Its Composition and Properties in Health and Disease, with Special Reference to "Turning Sickness".**—*J. Comp. Path.* **52.** 222–228. [17 refs.]

II. Frauchiger, E., & Hofmann, W. (1939). Liquoruntersuchungen beim Rind. [**Examination of the Cerebrospinal Fluid in Cattle**].—*Schweiz. Arch. Tierheilk.* **81.** 487–499. 2 figs.

I. The C.S.F. from 33 normal animals was examined, and the results, as to cell counts, globulin, protein, colloid, chemical constituents and physical properties are noted.

The site chosen for puncture was the atlanto-occipital space. With the head fully flexed, the approach was made in the middle line at the level of a line joining the anterior borders of the wings of the atlas. A 2·5 inch needle with a bore of

$\frac{1}{16}$th inch was found to be most efficacious for adult cattle. The samples obtained were comparatively free from blood contamination. The normal C.S.F. was found to be water clear, with an average of ten leucocytes per c.mm., and 34·3 mg. % total protein.

In 15 cases of "turning sickness"—an encephalitis [*V. B.* **7.** 169.]—the pressure was found to be considerably above normal, the fluid frequently turbid and liable to clot with a higher cell count and increased total protein. Five specimens of C.S.F. from cases of rinderpest, trypanosomiasis and East Coast fever showed little change from the normal.

Two tables comparing the complete findings in both the normal and encephalitic animals are given.

II. These investigations were conducted on 12 normal and an unspecified number of diseased cows to determine first the normal characters of bovine C.S.F., and then the significance of any change in disease as an aid to diagnosis.

A description is given of the needle used. The site chosen for lumbo-sacral puncture was in the middle line at the level of a line joining the most anterior portions of the two tuber coxae, and for atlanto-occipital puncture, in the middle line approximately a hand's breadth behind the prominence of the poll. 20–30 c.c. were withdrawn without causing any harm. Haemorrhage from the surrounding vessels sometimes complicated the operation and rendered the fluid unsuitable for examination. The fact that more blood was seen in the first few c.c.'s than in the bulk of the sample, and also that when centrifuged the supernatant fluid became clear, readily distinguished this haemorrhage from a fluid blood-stained by some pathological process.

A table is given of the physical and chemical properties of the fluid. Although little clinical information can be gathered from the pathological findings, it is suggested that the increase in the number and a change in the nature of the cells which occur in all types of meningitis, and the presence of globulin as indicative of an organic disease of the C.N.S., are points of clinical value.—C. W. Ottaway.

Tehver, J. (1939). **The Micro-Relief Elements of the Stomach and Intestine in Domestic Animals.**—*Acta Comm. Univ. tartu.* (*dorpat.*). **34.** No. 9. pp. 47. 7 plates. [Numerous refs.] [In English].

An account of the histological structure of tissues when viewed by stereoscopic vision, the term "micro-relief" being used to describe the relations of the constituents of the tissues to each other when so examined. Special technique employed in the preparation of the tissues is described.

The epithelial micro-relief elements of the intestinal tract of domestic animals vary greatly according to the nature of the animal. Areas associated with a specific function can be identified. In this paper a record is given of the general morphology of these elements, including details of their external shape, number and approximate dimensions, and position with regard to the long axis of the intestine. Comparative features in the carnivora, herbivora and the ruminant are discussed.
—C. W. Ottaway.

Lewis, A. A., & Turner, C. W. (1939). **The Mammogenic Hormones of the Anterior Pituitary. I. The Duct Growth Factor.**—*Res. Bull. Mo. agric. Exp. Sta.* No. 310. pp. 72. 18 figs., 15 tables. [Numerous refs.]

There is a decrease in pituitary weight in proportion to body weight during development of steers and heifers. Pituitaries of growing beef bulls are larger than those of heifers of similar body weight. The pituitaries of parous females were found to be larger than those of virgins in proportion to body weight. A

considerable, but non-permanent, increase in anterior pituitary weight occurred during lactation. A method for the assay of the duct growth factor of mammogen, using 15–25 g. male mice, is described. The mammogen content of AP from pregnant dairy and beef cows was found to be low in early and late pregnancy, rising to a peak at about 150 days. Non-pregnant cows were found to have an appreciable amount of mammogen in the pituitary. The content was highest in lactating dairy cows. Foetal pituitaries contained an appreciable amount of hormone. Oestrogen administration did not produce any marked effect on the mammogen content of rabbit pituitaries. Mammogen was found to be distinct from other pituitary hormones in being soluble in lipid solvents and not isoelectrically precipitated from alcohol.—J. M. Robson.

Severinghaus, A. E., & Thompson, K. W. (1939). **Cytological Changes Induced in the Hypophysis by the Prolonged Administration of Pituitary Extract.** —*Amer. J. Path.* **15.** 391–412. 33 figs. on 4 plates. [Numerous refs.]

The authors believe that the cytological changes which occur in the anterior pituitary following the prolonged administration of pituitary extract are due to the following sequence of events :– (1) the endocrine glands related to the anterior lobe (gonads, thyroid, adrenals) are activated ; (2) the increased secretion of these activated glands in turn stimulates the anterior lobe which augments with its own secretion the injected extract ; (3) the injection of foreign protein results in the production of anti-hormones, and (4) the anti-hormones at first neutralize the injected pituitary extract, and later the secretion of the hypophysis of the injected animal itself. This leads to the atrophy of the gonads, thyroid and adrenals. This atrophy in turn brings about in the anterior lobe certain changes which are characteristic of gonadectomy and thyroidectomy.—J. M. Robson.

Silberberg, M., & Silberberg, R. (1939). **Growth Processes in Cartilage and Bone Subsequent to Gonadectomy and Administration of Anterior Pituitary Extract of Cattle in Immature Male and Female Guinea Pigs.**—*Amer. J. Path.* **15.** 55–71. 4 tables. [16 refs.]

In immature g. pigs, gonadectomy causes an increased proliferation of the euhyaline cartilage in various cartilaginous tissues. In males hyperplastic growth is more accentuated, whereas in females a more pronounced tendency to hypertrophy is present. Degeneration occurs more frequently and to a greater extent in males than in females. Calcification and ossification of the cartilage appear balanced in females, but in males disturbances are observed in the zone of ossification ; there is also a tendency to fibrosis of the bone-marrow. The authors believe that the increased proliferation is due to a non-specific stimulation of the anterior pituitary subsequent to gonadectomy.—J. M. Robson.

De Wit, J. J. D. (1938). Eenige resultaten, verkregen bij onderzoekingen op het gebied der corpus luteum-physiologie. **[Research on Physiology of the Corpus Luteum].**—*Tijdschr. Diergeneesk.* **65.** 973–982. 1 fig., 1 table. [English, French and German summaries].

The author examined the amount of progesterone in the organs of pigs and cattle by tests on female bitterlings, which proved to be very much more sensitive and more rapid than the test of Allen and Corner with castrated rabbits or the Clauberg test with very young rabbits.

Female bitterlings have an external oviduct. They are placed in a small aquarium tank and the hormone-containing extract is added to the water to be tested. If progesterone is present the oviduct increases in length within five hours. By plotting a graph in terms of length of oviduct and amount of hormone, when

the latter is known, it is possible to provide a standard with which the amount of hormone in untested samples can be compared.

By using this test the progesterone content of the ovaries and placenta of sows and the ovaries and blood of cows was determined.

Corpora lutea from the ovaries of non-pregnant sows contained a measurable amount of progesterone and mature corpora lutea contained about seven times as much. The ripe ovarian follicles also contained a considerable amount of progesterone, but only a trace was found in the placenta. The corpus luteum of a pregnant cow contained 27γ per g. of progesterone, but the blood of the animal contained more.—JAC. JANSEN (UTRECHT).

WEBSTER, W. Maurice. (1939). **Studies on Reproduction in Romney Marsh Sheep. (1) Factors Influencing the Fertility of Romney Rams in New Zealand.**—*N.Z. J. Sci. Tech.* **21.** 130A–136A. 8 tables.

This report deals with part of a research project commenced in 1935 and still in progress. A comprehensive questionnaire was circulated to all Romney breeders in New Zealand, of whom only 117 out of a possible 650 responded. The report analyses in a series of tables the data furnished by these breeders. W. found that the incidence of sterility was highest on flat, lowland country, which is more extensively manured and carries a sward chiefly of rye grass and white clover. Less ram sterility was reported from the more hilly areas, where the soil fertility is on a lower plane, less fertilizing is practised, and the pastures contain a greater proportion of the finer grasses.—LEWIS FITCH.

SPRUNT, D. H., & MCDEARMAN, Sara. (1939). **Studies on the Relationship of the Sex Hormones to Infection. II. The Effect of Pseudopregnancy on the Spread of India Ink in the Skin of Rabbits.**—*Endocrinology.* **25.** 308–311. 3 tables. [10 refs.] [Authors' summary copied *verbatim*]. [For part I, see *V. B.* **9.** 277].

In this report we have shown that the spread of India ink in the skin of 14 pseudopregnant rabbits was significantly less than the spread in 32 adult female rabbits.

The inhibiting effect of pseudopregnancy is discussed and similar examples of this are cited from the literature.

TECHNIQUE AND APPARATUS

SCOTT, G. H., & PACKER, D. M. (1939). **The Electron Microscope as an Analytical Tool for the Localization of Minerals in Biological Tissues.**—*Anat. Rec.* **74.** 17–29. 2 figs. [11 refs.]

The construction and principles of the electron microscope are given and its application to the selective demonstration of the presence of Mg and Ca in tissue sections is described. The histochemical significance of the method is emphasized since the reactions are carried out in a completely anhydrous medium and, it is claimed, are therefore not subject to the errors inherent in any aqueous reagent applied to frozen and dehydrated tissue.—R. ALLCROFT.

HAGEMANN, P. K. H. (1938). Die Fluoreszenzmikroskopie in der Tropen-Medizin. [**Fluorescence Microscopy in Tropical Medicine**].—*Acta Conv. tert. trop. malar. Morbis, 1938.* Pt. 1. pp. 452–456. [6 refs.] Amsterdam: Societas Neerlandica Medicinae Tropicae. [In German].

The apparatus for fluorescence microscopy does not greatly differ from that

for ordinary microscopy, the chief differences being the need for an ultra-violet ray lamp, quartz or special glass lens systems and a fluorescent dye for the object of examination.

Fluorescence microscopy is chiefly valuable in virus research by the primulin-thioflavine or resorcin-thioflavine staining methods, and in tuberculosis diagnosis, using auramin as a dye. The virus elementary bodies and tubercle bacilli fluoresce intensely and can be seen very quickly in the diagnostic preparation.—J. E.

I. Bock, E., & Oesterlin, M. (1939). Ueber einige fluoreszenzmikroskopische. Beobachtungen. [**Observations by Fluorescence Microscopy**].—*Zbl. Bakt I. (Orig.).* **143.** 306-318. 5 tables. [8 refs.]

II. Dabelstein, H. (1939). Das Fluoreszenzmikroskop in der laufenden Tuberkulosediagnostik. [**The Fluoresence Microscope in TB. Diagnosis**]. —*Ibid.* 242-243. 1 fig. [5 refs.]

I. Experiments were performed to study with the fluorescence microscope the effects of atebrin and quinine on the parasites in *Plasmodium innui* and *Pl. knowlesi* infections in monkeys. In all cases, it was impossible to demonstrate the parasites by fluorescent light in untreated animals, but following the intramuscular injection of 0·1 g. atebrin the parasites could be seen by fluorescent light in 10 minutes, and within three hours after injection of 0·225 g. quinine. The subsequent changes noted in the parasites indicated that these drugs had a direct action in producing a cure.

Experiments were also conducted on the staining reactions and general effect on various trypanosomes and plasmodia of rivanol, trypaflavine, atebrin, auramin, and primulin. A summary of the results is given.

For the demonstration of tubercle bacilli by fluorescence, preliminary staining with auramin gave the best results. [See also *V. B.* **9.** 52].

II. Material from 900 cases of suspected TB. were examined with the Hagemann fluorescence microscope. As compared with the Ziehl-Neelsen method, the degree of accuracy was approximately the same, although results were obtained more speedily with the former. In view of the cumbersome nature of Hagemann's apparatus, a modified and cheaper apparatus was constructed on the same principle. This consists of a generator lamp, a condenser, a diaphragm, a cooling chamber filled with a 10% solution of copper sulphate, and a standard microscope. Two filters are placed immediately in front of the mirror of the microscope, and a yellow cap is fitted into the eye-piece to absorb any excess of ultra-violet rays. The work is performed in a dark room. The whole apparatus is illustrated in a photograph. —C. W. Ottaway.

Ronchèse, Anne-Marie. (1940). Procédé de numération directe des germes dans les suspensions microbiennes. [**Procedure for a Direct Enumeration of Micro-Organisms in Bacterial Suspensions**].—*C. R. Soc. Biol. Paris.* **133.** 190–193.

A detailed description is given of an accurate, direct count of the bacterial content of any given suspension, by which errors due to motility and unequal distribution of bacteria are eliminated. Equal volumes of the bacterial suspension and a colloidal suspension of silver chloride are mixed with a liquid agar-gelatin preparation and $\frac{1}{3}$ c.c. of the mixture is allowed to solidify in a homogeneous film on a graduated slide. After appropriate staining, the microdosage of the silver chloride in the film is very accurately estimated by washing the slide with 10% ammonia solution, followed by titration with ammoniated potassium cyanide solution and potassium iodide solution. The result gives the volume of the

bacterial suspension actually employed for the count, since the original mixture contained equal volumes of bacterial suspension and colloidal silver chloride suspension. The area of the film and of a single microscopic field are measured and the average number of bacteria in each field counted. From these data the number of bacteria in the film can be calculated and, as its exact volume has been ascertained, the bacterial count per c.c. of suspension is easily estimated.—R. O. M.

ROEPKE, M. H., & FITCH, C. P. (1940). **Studies on the Photoelectric and Volumetric Methods for the Determination of the Density of *Brucella abortus* Antigens.**—*Cornell Vet.* **30.** 1–13. 1 fig., 6 tables. [7 refs.]

FITCH *et al.* (1930) found that a volumetric method for the standardization of antigens after centrifugation was more accurate than visual opacity comparison with standards. R. and F. compared the volumetric method and standardization by two photoelectric instruments specially adapted for this work. The chief advantages of photoelectric methods over visual opacity methods are the elimination of errors due to variations in light intensity and in the eyes of different workers.

Both instruments were adaptations of a photoelectric colorimeter [EVELYN, K. A. (1936). *J. biol. Chem.* **115.** 63]. In the first (A) one glass wall of the cell was replaced by " flash-opal " glass, allowing alteration of light bulbs and their position without affecting results. Light intensity was adjusted to a given value by the " flash-opal " cell. The second instrument (B) was very similar, but the photoelectric cell was placed at right angles to measure the light scattered by turbid suspensions instead of transmitted light (scattered at small angles from the main light beam) as in A. McFarland barium sulphate standards were found to give irregular results with both instruments, especially with A.

A comparison was then made of A and B with volumetric standard suspensions of four strains of *Br. abortus* prepared from cultures 1, 2, 3 and 5 days old. Concentrations for A of 0·01–0·033 % and for B of 0·025–0·15 % were used. (A stock, phenol-killed 1·49 % suspension of *Br. abortus* diluted with a solution of 0·5 % phenol and 0·85 % sodium chloride to give a 0·1 % suspension was used as a turbidity standard for B). It was found that the age of the cultures had no significant effect on volumetric-photoelectric relationships. Discrepancies, however, between volumetric and photoelectric standardization, especially with A, were marked. Heating of saline suspensions caused decreased readings with A and increased readings with B.

In a statistical analysis of the sensitivities of antigens standardized by the several methods, the authors conclude that these parallel the volumetric method more closely than either of the photoelectric methods tested.—C. V. WATKINS.

NOBATA, R. (1939). **A Simple Method for Supplying Carbon Dioxide Gas to Culture Tubes.**—*Jap. J. vet. Sci.* **1.** 610–616. 1 fig. on 1 plate, 1 table. [11 refs.] [In Japanese: abst. from English summary].

The upper portion of the sterile plug of the inoculated tube is cut off and pushed down close to the medium. Sodium carbonate and oxalic acid are mixed in a funnel-shaped, paraffined paper and placed on the pushed-down cotton plug, the flask or tube then being sealed with paraffin or wax.—F. T. BOYLE.

EPSTEIN, Pauline. (1938). **Hot Air Sterilization and Its Practical Application in Bacteriologic Laboratories.**—*J. Lab. clin. Med.* **23.** 390–404. 6 tables. 5 charts, [Numerous refs.]

A hot air sterilizer of special design is described. The following are the main features. It has three metal walls. The outer side of the flue is composed of two

walls, between which is an inch of asbestos insulation. The third and inner wall of the flue also forms the chamber. Dampers are inserted. Forced air circulation is provided by allowing the products of combustion to pass around and through the sterilizing chamber. This permits an even temperature. Heat is provided by thermostatically controlled gas burners. Temperatures are recorded by minimum and maximum thermometers.

An extensive study of time-temperature relation was made under various loads, of which the results are tabulated and shown in charts. E. found that if the sterilizer were unloaded, it maintained an even temperature, but that when loaded the temperature was not uniform throughout.

Bacillus subtilis, obtained from numerous sources, and a staphylococcus were used in the tests. Cultures were smeared on the walls of sterile test tubes. These were placed in various positions in the sterilizer and subjected to varying temperatures and periods.

It was found that, in order to ensure absolute sterility, regardless of whether the organisms are more or less heat resistant, the sterilization periods should not be less than one and one-half hours at a temperature between 155° and 160°C.

—H. E. Bywater.

Salchert, F. W. (1937). Studien über die Senkung der weissen Blutkörperchen. **[Sedimentation of White Blood Corpuscles].**—*Inaug. Diss., Berlin.* pp. 47. 1 fig., 16 tables, 13 graphs. [16 refs.]

S. studied the sedimentation of white blood corpuscles in numerous samples of citrated horse blood, using a special sedimentation tube provided with outlets at different levels to enable W.B.C. alone to be drawn off. The W.B.C. are present in the plasma above the column of R.B.C. and are much slower to sink than the latter. Samples were drawn off from the tube at different times after it had been filled and the white corpuscles counted so that the sedimentation rate could be calculated. This was most rapid during the first five hours; thereafter it was slow and sedimentation was not complete until 20-30 hours had elapsed. No clinical significance could be attached to the sedimentation rate, which was very similar in all the samples examined; 16 horses were used, some being healthy and some patients in the clinic.—J. A. Nicholson.

McCulloch, R. N. (1939). **Economy in Jetting Sheep.**—*Agric. Gaz. N.S.W.* **50.** 196-198. 3 figs.

Practical directions are given for restricting the loss of excess jetting fluid which normally occurs during this process. By collecting and using the waste over again the cost for fluid in jetting is reduced to one-fifth of a penny per head, the water required is reduced to one-fifth of a gallon per sheep and the undesirable accumulation of arsenic in the yards is kept at a minimum.—H. B. Carter.

MISCELLANEOUS

—. (1937). **Proceedings of the Twenty-fourth Indian Science Congress, Hyderabad, 1937. (Fourth Circuit).** pp. xli+614. Numerous figs., 1 plate, 9 tables, 4 maps. [Numerous refs.] Calcutta: Royal Asiatic Society of Bengal. [8vo] [31s. 6d.]

Included in the proceedings are sections on zoology (helminthology), agriculture, medical and veterinary research and physiology. All papers with any veterinary interest will be found in *Index Veterinarius.* **7.** No. 2, and abstracts of some of those published in full will appear in the *Veterinary Bulletin.*

—. (1939). **Proceedings of the Twenty-fifth Indian Science Congress, Calcutta, 1938. (Silver Jubilee Session).** pp. 2+li+Pt. I. pp. 77, Pt. II. pp. 380, Pt. III. pp. 309 and Pt. IV. pp. 329. Numerous figs., 8 plates, numerous tables, 11 charts. Calcutta: Royal Asiatic Society of Bengal. [8vo].

The proceedings of the 1938 congress were on a considerably more elaborate scale than those of previous years. Sections were included on zoology, entomology, medical and veterinary research, and physiology. All references of veterinary interest will be found in *Index Veterinarius*, **8.** No. 1, and separate abstracts of several of the presidential addresses to sections, published in full in the proceedings, will appear in the *Veterinary Bulletin.*

I. —. (1938). **[Survival of Semen Stored in Thermos Flasks].**—*Fecond. artif.* **1.** 33-34. [Suppl. to *Clin. vet., Milano.* **61**]. [Original article has no title].

II. Altara, I., & Adriano, P. (1938). La fecondazione artificiale nella lotta contro la sterilità delle bovine. Osservazioni e rilievi sui primi esperimenti in Piemonte. **[The Use of Artificial Insemination in the Fight against Bovine Sterility].**—*Ibid.* 34-44 and 49-53. 6 figs., 1 table. [6 refs.]

I. Semen collected from a bull and two rams was sent from Italy to Addis Ababa by air-mail, packed in thermos flasks. When it arrived 100 hours after dispatch, it was found to have retained its vitality unimpaired. It is hoped by this means to improve the livestock in Abyssinia without having to overcome the difficulty of acclimatizing animals to a new environment.

II. The practice of artificial insemination has been developed in Italy in order both to improve the breeds of livestock by using approved sires only and, particularly, to overcome the losses due to bovine sterility, which affects up to 40% of the breeding stock in some districts.

In addition to the actual work of artificial insemination, the Institutes set up for the purpose undertake research into the aetiology of bovine sterility, and give courses of specialized instruction to veterinarians. Cattle suffering from specific diseases, *e.g.* vaginitis, cervicitis, pyometra, etc., are treated before being inseminated; the results so far obtained have been satisfactory, 73% of such animals becoming pregnant.—J. A. Nicholson.

—. (1938). **Report of the Third International Conference on the Standardization of Hormones (Geneva, August 11th to 13th, 1938).**—*Bull. Hlth Org. L. o. N.* **7.** 887–899.

The purpose of the Conference was an attempt to arrive at agreement for the adoption of a stable, material standard for each of the recognized hormones of the anterior lobe of the pituitary gland and analogous principles found in urine or serum, and for the definition of a unit of activity in terms of a weight of each such standard. The Conference agreed that it was desirable and practicable to establish international standard preparations for each of the following:– gonadotrophic substance of human pregnancy urine, thyrotrophic substance of A.P., lactogenic substance of A.P. and gonadotrophic substance of pregnant mare serum. Agreement was also reached with regard to standards and units to be adopted for biological assays of the above substances. On information received the Conference was unable to recommend the establishment of standards for gonadotrophic principle or principles of A.P., corticotrophic (adrenotrophic) substance of A.P., growth-promoting hormone of A.P., the principle or principles of the " pars intermedia " of the pituitary body, and other " anterior pituitary-like " hormones.—N. J. S.

FLÜCKIGER, G. (1939). Étude d'une législation concernant la mise en vente des remèdes préconisés contre les maladies animales. [**Survey of Laws about the Sale of Remedies for Animal Diseases**].—*Bull. Off. internat. Epiz.* **18.** 323–342. Discussion pp. 482–489.

This survey deals with the legislation in 16 European countries in respect of the manufacture and sale of vaccines, sera, drugs and other similar products for the treatment and control of animal diseases. It is clear that great differences exist in the various countries cited. For example, in Great Britain, Egypt and Holland, there is no special legislation. Some countries, on the other hand, have very complete and detailed laws, *e.g.* Germany, Italy, Denmark and Portugal. In Rumania the manufacture of sera and vaccines is a State monopoly. In Switzerland the federal veterinary office controls the preparation of all such products. In general in the countries mentioned, there is no discrimination in the manufacture and sale of medicaments for human or veterinary use. In Germany there is a strict control over valueless remedies. *L'Office International des Epizooties* urges that legislation should be set up in all countries to deal with the sale of animal remedies, so that the exploitation of the livestock industry may be prevented. In the subsequent discussion, it was proposed that the manufacturers of secret remedies should be obliged to state the exact composition of their products. This proposition was accepted by the delegates of all countries.—N. J. SCORGIE.

LIÉGEOIS. (1938). L'arme bactériologique en temps de guerre. [**The Bacteriological Weapon in War**].—*Maroc méd.* **18.** 426-435. [8 refs.]

The bacterial weapon would be difficult to control and might recoil. The aggressor would select a " virus " [the term is used by the author in the broad sense] against which its army and civil population would be protected by vaccination and an organized prophylaxis. Although it is extremely improbable that one country could develop a virus totally unknown to others yet the element of surprise rests with the aggressor, since the disease might become epidemic before control measures could be applied. Pasteur considered using " virus " for the destruction of harmful pests and the method has been employed against locusts, rats and rabbits. The Germans are said to have attempted to spread glanders and mange in the last war, but to have met with little success owing to the highly organized veterinary control. Rinderpest, glanders, and anthrax in animals, and plague, cholera and, according to the author, typhus in man, are the diseases which could be disseminated. Contamination of the air, ground and water could be effected by secret agents and from aircraft. Given the necessary organization and material L. discusses the vaccination of the entire population of a country and in the face of this *arme nouvelle* he pleads for such an organisation.—D. BAMFORD.

—. (1939). **Animals and Air Raids.**—*Pamph. Roy. Soc. Prevent. Cruelty Anim., Lond.* No. 326. pp. 19. Numerous figs. [3rd Edit.] [8vo] [1d.]

The information given here is covered by pamphlets already abstracted [*V. B.* **10.** 633 and 634].

HANDA, B. N. (1938). **A Study of the Punjab Sheep and the Shepherds with a Particular Reference to the Management, Feeding and Improvement of their Flocks.**—*Vet. Bull. civ. vet. Dep. Punjab.* No. 13. pp. 20. 11 figs. on 7 plates.

This bulletin is largely concerned with animal husbandry and is written for stockowners. Reference is made to the use of dips for sheep scab.—H. E. H.

McCallan, E. A. (1939). **Report on the Development of Agriculture in the Bahamas.** pp. 107. 17 appendixes. [Numerous refs.] Nassau, N. P., Bahamas: The Nassau Guardian. [8vo].

The animal husbandry section of this report is chiefly composed of recommendations for improvement of breeding methods. There is one paragraph on diseases. The chief pests were cattle fever ticks, lice on sheep and " measles " in hogs, and there was high poultry mortality in some settlements.

Evans, G. (1939). **Note on the Possibilities for the Agricultural Settlement of Involuntary Refugees from Central Europe in the Hinterland of British Guiana.**—*Appendices to the Report of the British Guiana Refugee Commission to the Advisory Committee on Political Refugees appointed by the President of the United States of America.* pp. 3-24. London: H.M. Stat. Office. [8vo] [2s.]

In discussing the health aspects of settlement in British Guiana reference is made to mal de caderas [*Trypanosoma equinum* infection] and to bat-transmitted rabies in horses, with mention of horse flies [*Tabanus* spp.] which are mechanical vectors of the former disease. The need for veterinary investigation in the savannah country is stressed.—J. E.

OFFICIAL AND OTHER REPORTS

Great Britain. (1939). **Statistical and General Report of the Army Veterinary Services, 1938-1939.** [Murray, C. A.] pp. 28. 12 tables. London: The War Office. [8vo].

The average strength of horses for the year was 3,330 in Great Britain and Northern Ireland, 314 in Egypt and 348 in Palestine and Trans-Jordan, and their average age was 11·36 years. A comparative, tabulated statement of the number and nature of casualties, their cause and the influence of age on wastage is given.

The Army Veterinary School at Aldershot has been closed and the Royal Army Veterinary Corps Laboratory has been established in its place to carry on the work of the School, other than that of teaching. An investigation into Osteodystrophia Fibrosa of horses is being carried out with the primary object of correlating the significance of radiological observations and clinical symptoms.

The School of Farriery has been abolished and the Royal Army Veterinary Corps has assumed all farriery duties of units other than horsed cavalry and horsed regiments of artillery.—G. Williamson.

India. (1939). **Agriculture and Animal Husbandry in India, 1936-37.** pp. vi+503. 2 plates, 15 appendixes. Delhi: Manager of Publications. [4to] [Rs. 7] [11s.]

Cattle Improvement.—As a result of a public appeal by the Viceroy, Lord Linlithgow, 1,322 pedigree bulls were presented or promised, together with cash subscriptions amounting to Rs. 1,65,000. Many provinces have started cattle improvement associations as a result of these gifts. A move was made to prevent the premature slaughter of cows which go dry in cities. A survey was made of the number and quality of the cattle maintained and of the amount of milk and milk products produced and consumed by the cultivators in seven breeding tracts.

Animal Diseases.—Bovine mortality from contagious diseases was higher than in either of the two preceding years, and of the 279,397 reported deaths, 160,055 (57·3 %) were due to Rinderpest, and 43,456 (15·6 %) to Haemorrhagic

SEPTICAEMIA. BLACKLEG and ANTHRAX accounted for 12,863 and 10,478 deaths respectively. There were 2,300,000 inoculations against rinderpest, of which 90% were by means of goat vaccines.

RESEARCH.—Considerable work was done on diseases of sheep, goats and poultry, while some investigations concerned horses and swine. Contagious diseases of cattle remain the most important problem which the veterinarian must face.

EDUCATION.—There were 604 students attending the Indian veterinary colleges at the end of the year, and 75 were awarded diplomas. In addition, some 36 graduates attended post-graduate and refresher courses.

FINANCE.—Total expenditure of the Central and Provincial Veterinary Departments was Rs. 73,30,000, an increase over the preceding year of nearly Rs. 5,00,000.

NEW ZEALAND. (1939). **Report of the Director General of Agriculture, 1938-39.** [COCKAYNE, A. H.]—*Rep. Dep. Agric. N.Z., 1938–39.* pp. 4–6.

C. reviews the sheep, pig, and cattle industries. The total sheep population shows a decline, but the number of breeding ewes is up on the previous year. The United Kingdom has imposed a mutton and lamb quota of 190,000 tons which is less than the breeding ewe population of 20,000,000 is likely to produce in a favourable year.

During his recent visit to Great Britain, C. paid special attention to the requirements of the bacon trade and considers the Dominion well able to supply the type of bacon required.

The beef cattle in New Zealand have increased by 200,000 cows over the past three years, due largely to the development of the chilled beef industry.

ANIMAL RESEARCH.—A new division of Animal Research has been formed. Dr. J. F. Filmer has been appointed Director and both the Wallaceville Veterinary Laboratory and the Ruakura Farm of Instruction have been made special animal research stations. The Division has on its staff twelve veterinarians, and 29 other technical officers, but the staff is still short of a number of specialist officers, particularly in the field of genetics, parasitology and pathology. The closest contact is to be maintained between the field staffs of the Department and the new Division, and special care is being taken to ensure this direct and vital co-ordination.—L. F.

SOUTHERN RHODESIA. (1939). **Report of the Director of Veterinary Research for the Year 1938.** [LAWRENCE, D. A.] pp. 7. Salisbury: Govt. Stat. Off. [fcp].

The staff consists of the Director, one veterinary research officer and four European assistants. A large amount of diagnostic work is carried out, consisting mainly of microscopic examinations and serological tests.

Vaccines are issued by the laboratory for immunization against BLACKLEG, BOVINE CONTAGIOUS ABORTION, HORSE SICKNESS, CHICKEN POX, BLUE TONGUE of sheep, REDWATER, and ANAPLASMOSIS. *Oesophagostomum columbianum* and *Haemonchus contortus* remedies are issued, as well as " Tetram ", an emulsion of tetrachlorethylene prepared at the Onderstepoort laboratory, which gives good results against worms of the stomach and small intestine.

Although very little time could be devoted to research, certain experiments, which were in progress during the previous year, were continued. *Oesophagostomum columbianum* and *Haemonchus contortus* were found to survive in infected animals from 7–14 months, even when these were undergoing treatment. CONTAGIOUS ECTHYMA was diagnosed in two sheep, and the disease was successfully transmitted to healthy sheep.

The differential diagnosis of THEILERIA INFECTIONS presents some difficulty. Koch's bodies, not associated with EAST COAST FEVER, were detected in smears received from widely separated parts of the territory. RABIES has appeared again for the first time in 25 years. A case of RICKETTSIASIS in a dog is recorded. The symptoms resembled those of the " biliary fever " form of a *Babesia canis* infection. Parasites resembling *Rickettsia canis* were present in the blood ; these conformed to the description given by LESTOQUARD and DONATIEN in Algeria in 1935. Attempts failed, however, to transmit the disease by means of larvae of ticks taken from the infected dog.

SWEATING SICKNESS of calves is prevalent during the latter half of the rainy season. Although this condition is usually thought to be an infectious disease, its cause remains unknown. L. suggests that errors in metabolism, rather than an infective agent, should be investigated as possible causes. He mentions the beneficial results obtained in Kenya by the use of liver extract. A condition spoken of as " BLINDSICKNESS " is thought to be identical with BOVINE MALIGNANT CATARRH. In one case " blindsickness " was transmitted to a cow by the inoculation of large quantities of blood from an infected animal.

The revenue derived from the sale of the laboratory's products was £2,245, and expenditure amounted to £6,731.—J. A. GRIFFITHS.

PALESTINE. (1939). **Annual Report of the Department of Health for the Year 1938.** [HERON, G. W.] pp. 130. 1 fig., numerous tables, 2 maps, 1 appendix. Jerusalem : Printing and Stat. Off. [fcp] [150 Mils].

During 1938, 85 cases of RABIES were reported among animals including 61 dogs, nine jackals, eight cats, five solipeds, one wolf and one cow. 1,949 bitten persons, of whom 1,504 had been bitten by dogs, and 119 domestic animals received treatment. Of the three human cases which occurred, two resulted from injuries inflicted by wolves and the other from dog bites. A vaccine consisting of a 5% suspension of carbolized, killed, fixed virus (rabbit's brain) in normal saline is prepared for prophylactic inoculation of dogs, and during the year 115 dogs have been so protected. In the course of rabies control 16,641 animals, including 12,708 dogs were destroyed in 1938. Plans and specifications of isolation kennels are approved by the Chief Veterinary Officer and adequate isolation accommodation has been made available by 22 out of the 48 councils affected.—F. T. BOYLE.

BASUTOLAND. (1939). **Report of Veterinary and Livestock Division, 1937-38.** [HENDERSON, G. T.]—*Rep. Dep. Agric. Basutoland, 1937–38.* pp. 6–34. 11 tables.

The ANTHRAX position has so improved that universal inoculation has been abandoned. Inoculations are now confined to animals in infected or in contact areas and to those imported or exported. Only four deaths proved to be due to anthrax. 140,686 animals were inoculated. BLACKLEG is very prevalent. There have been no cases of SHEEP SCAB during the past six years. In the lowlands, *Ixodes rubicundus* causes " TICK PARALYSIS " during the autumn. The sheep ked is prevalent. *Oestrus ovis* and *Stomoxys calcitrans* cause losses after shearing. PEDICULOSIS is universal. There were fewer cases of EQUINE MANGE. *Senecio* poisoning, spoken of as " GRASS STAGGERS ", is confined to the highlands ; only one case of AFRICAN HORSE SICKNESS was reported. OSTEOPOROSIS is common in the lowlands, owing to excess of maize. There is a scheme in operation for the compulsory monthly dosing of sheep and goats for HELMINTHS and 11,518,613 doses were issued. A policy of free dipping for ked-infested sheep is in force ; ACTINO-MYCOSIS, CATARRHAL FEVER of sheep, and FOWL POX are fairly wide-spread.

BOVINE PIROPLASMOSIS is very rare. All Government-owned cattle have been immunized against ANAPLASMOSIS.—J. A. GRIFFITHS.

HONG KONG. (1939). **Annual Report of the Colonial Veterinary Surgeon for the year 1938.** [MACKENZIE, W. J. E.] pp. 4. Stanley: Hong Kong Prison. [fcp] [30 cents].

The position as regards animal health is good and on the whole improving, serious outbreaks of disease being few. Infestation with the common helminths is fairly wide-spread.

During the year the ordinary measures of quarantine of imports, segregation of suspected cases and stoppage of movement have been fairly effective in disease control, such control being rendered more difficult by the influx of animals due to adjacent hostilities.

Among cattle CONTAGIOUS ABORTION still causes considerable loss. Immunization with live vaccine has been discontinued; rigid segregation of infected cows is practised and a steady improvement in control of the disease is noted.

Of 272 dogs, three monkeys and four cats suspected of RABIES, one dog was found to be infected. Vaccination of dogs against rabies is not carried out by the Government, but owners are encouraged to have their dogs vaccinated.

One serious outbreak of RINDERPEST occurred in Hong Kong with 170 cases and 94 deaths.

The incidence of TUBERCULOSIS among animals is much less than in European countries and among native cattle and buffaloes is practically unknown. In the larger herds tuberculin tests are carried out regularly.

Figures are given regarding animals passing through quarantine during the year.—F. T. BOYLE.

TRINIDAD AND TOBAGO. (1939). **Report of the Veterinary Division, 1938.** [METIVIER, H. V. M.]—*Rep. Dep. Agric. Trin. Tob. 1938.* pp. 64–69.

No cases were reported of EQUINE ENCEPHALITIS, GLANDERS or EPIZOOTIC LYMPHANGITIS. Only two deaths from ANTHRAX occurred among cattle. In the rural districts, four cases of TUBERCULOSIS were found in 1,217 cattle tested. Seven cattle at the stock farm were found to be infected with TB., and cases were found at the abattoirs at Port of Spain and San Fernando as well as among both local animals and animals imported (from British Guiana). There were a few cases of HAEMORRHAGIC SEPTICAEMIA in Tobago, where the disease was controlled by the use of serum and bacterin. Among mules, STRANGLES and INFLUENZA were prevalent. Among bovines, CONTAGIOUS ABORTION, PIROPLASMOSIS, PARASITIC GASTRITIS and CONTAGIOUS OPHTHALMIA in calves are mentioned as being prevalent. There were no other losses from contagious diseases. Experiments were carried out dealing with the transmission of RABIES to dogs by artificially infected *Desmodus* bats. The incidence of this form of the disease in the field is negligible among dogs. There were only two cases of rabies transmitted by bats during the year; both were in cattle. The distribution of infected bats was, however, again wide-spread throughout the island.—J. A. GRIFFITHS.

GERMANY. (1938–1939). Veröffentlichungen aus den Jahres-Veterinär-Berichten der beamteten Tierärzte Preussens für die Jahre 1935 und 1936. Band I und II. **[Report of the Government Veterinarians, Prussia, 1935 and 1936. 2 Vols.]** [MÜSSEMEIER, & GAEDE]. pp. 114 and 159. Numerous tables, 4 charts, 2 maps. Berlin: Richard Schoetz. [4to].

Part I contains statistical and descriptive reports of scheduled diseases: the

table below shows the number of affected parishes and animals for each of the two years. Notes on these diseases and their control are given in the original. TUBERCULOSIS cannot be usefully included in the table; in 1935 (in the Ostertag control scheme) about 28,800 cattle were killed on account of TB.—8,666 were killed under "strong suspicion" of TB. and 225 were killed under "simple suspicion". In 1936, the corresponding figures were 27,200, 9,000 and 143. Figures are given for the results of bacteriological diagnosis of material from suspected open cases of TB.—lung mucus, udder secretion, uterine exudate and faeces. The number of herds enrolled in the control scheme averaged 300,000 for the biennium, including about three million cattle. Compensation paid averaged 4,700,000 RM.

	1935.		1936.	
	Parishes.	*Affected Animals.*	*Parishes.*	*Affected Animals.*
Anthrax...	399	521 (cattle) 123 (sheep)	397	450 (cattle) 284 (sheep)
Glanders	5	9	0	0
Swine Erysipelas ...	8,518	26,093	10,002	37,501
Fowl Cholera	57	1,600 (fowls)	67	2,886 (fowls)
Swine Fever and Swine Plague	348	1,463	302	3,442
Blackleg	252	357	201	283
Foot and Mouth Disease	287	343	83	154
Rabies	91	87 (dogs)	120	131 (dogs)
Sheep Pox	3		0	
Vesicular Exanthema ...	166	247 (horses) 139 (cattle)	110	136 (horses) 131 (oxen)
Fowl Plague	1	—	0	—
Equine Mange ...	108	225	104	253
Bovine Mange	5	49	1	17
Sheep Scab	62	48	105	82

Part II is a digest, including quotation of the reports of the several veterinary officials of Prussia. Section A deals with strangles, infectious abortion, Borna disease, infectious anaemia, sterility and joint-ill—all in horses; mastitis, Johne's disease, salmonellosis, brucellosis, malignant catarrh, chronic haematuria and calf pneumonia—all in cattle; mastitis, abortion, vaginitis and "Schafrotz" ("catarral fever")—all in sheep; paratyphoid, pseudotuberculosis, influenza, sero-fibrinous arthritis, rhinitis, hepatitis and heart muscle degeneration—all in pigs; TB. and salmonella infection in fowls, "goose influenza", dog distemper, Stuttgart disease

and diseases of game. Parasitic diseases, cases of poisoning and nutritional bone diseases are also described.

Section B deals with horse shoeing, knackeries, dairies, markets, breeding, etc., and section C with meat and food inspection.—J. E.

HUNGARY. (1938). A m. kir. Országos Állategészségügyi Intézet működése az 1937. évben. [**Report of the National Animal Health Institute, Budapest, for 1937**]. [MANNINGER, R.]—*Állatorv. Lapok.* **61.** 299–303. 2 tables.

The activities of the Institute comprised diagnostic examinations, tests of commercial vaccines and sera, and research work. 3,137 blood samples from cattle and 12,684 from pigs were examined for BRUCELLOSIS, of which 536 and 3,091 respectively were found positive. Of 280 blood samples from equines, 4 were positive for GLANDERS ; of 60 horse blood samples 1 was found positive for DOURINE. Examination of 6,687 fowl blood samples from 63 poultry farms not under state sanitary supervision showed 307 (4·6 %) to be positive for FOWL TYPHOID [M. uses this term for infection with both *Salmonella sanguinarium* and *S. pullorum*], while of 79,401 samples sent in from 169 state-supervised farms, 2,301 (2·9 %) were found positive.

Of 778 brains of various animals examined for RABIES, 257 contained Negri bodies. In 14 cases samples were proved to be rabies by animal inoculation, although Negri bodies were absent. Aujeszky's disease was found in 45 cases.

The vaccine and serum supervision service of the Institute tested 185 vaccines and 104 sera.

Research work was done mainly on porcine tuberculosis, the preparation of synthetic tuberculin, and the improvement of culture methods for *S. suipestifer*, the morphology of *Vibrio foetus*, the pathological histology of sheep pox and actinomycosis and the histology of the Van Es tuberculin reaction. No details are given.—E. MARTIN.

—. (1935). Nauchno-issledovatel'skaya rabota UzNIVI v 1935 godu. [**Report on Work of the Uzbek Veterinary Research Institute, 1935**].—*Bull. Uzbek. nauchn.-issled. vet. Inst., Tashkent.* No. 3. pp. 3–5.

A general outline of the work and the future programme of the Institute. —E. MARTIN.

MOROCCO. (1939). Rapport sur le fonctionnement du laboratoire de recherches du service de l'élevage du Maroc durant l'année 1938. [**Report of the Research Laboratory of the Livestock Service for 1938**]. [ZOTTNER, G.] —*Arch. Inst. Pasteur Algér.* **17.** 395–409. [12 refs.]

The results of research on BRUCELLOSIS, PIROPLASMOSIS, TRYPANOSOMIASIS, RABIES, FOOT AND MOUTH DISEASE, STRONGYLOSIS and HABRONEMIASIS are summarized. The results of the examination of 2,345 morbid specimens for diagnosis, 164 samples of feeding stuffs etc. for detection of adulteration or contamination, and chemical analyses of 318 samples of water, food etc., are classified and tabulated.

It is stated that field trials of the immunizing ability of lanolin vaccine against BRUCELLA INFECTION demonstrated the success of the method, and laboratory trials showed the vaccine to be practically harmless to man and animals. Observations were made on the treatment of strepto- and staphylococcic skin affections with the sulphamide group. For the treatment of PIROPLASMOSIS, gonacrine was still considered to be the best agent ; it is stated to be of some though not of great value in the treatment of ANAPLASMOSIS in bovines and sheep. Vaccination, however, is considered of great value against these conditions, and the number of

animals so dealt with increased by 50%. Naganol as a prophylactic against DOURINE can be used in subcutaneous or intramuscular doses of 0·0035 g. per kg. every ten days for months on Moroccan asses, without producing adverse effects. The wide-spread outbreaks of FOOT AND MOUTH DISEASE in the two previous years were due to Type A virus. The relation of calcium metabolism to cutaneous HABRONEMIASIS is being investigated.—G. WILLIAMSON.

UNITED STATES OF AMERICA. (1939). **Report of the Veterinary Division U.S. Army 1938.** [KELSER, R. A.]—*Rep. Surg. Gen. U.S. Army 1938.* pp. 190-237. 1 fig., 12 tables.

GENERAL.—The strength of the Veterinary Corps was 126 veterinary officers. During the year the increased demand for the services of the corps, especially for food inspection work, was greater than could be provided. Duty was undertaken at 132 stations, an increase of 17 over the previous year. On June 30th, 1938, the strength of the Veterinary Reserve Corps was 1,332, an increase of 262 officers for the year. Veterinary officers were instructed at the Army Veterinary School, the Medical Field Service School, the Chemical Warfare School and the University of Kentucky.

LABORATORY SERVICE.—This was conducted at four centres, Washington, Fort Sam Houston, Tex., Fort Mason, Calif. and the Philippines. The Medical Research Board in Panama, to which a veterinary officer is assigned, conducted investigations on [equine] encephalomyelitis and equine degenerative arthritis.

MEAT AND DAIRY HYGIENE.—All foods of animal origin for the regular army are inspected by veterinary officers. Veterinary sanitary supervision of all dairies and milk plants supplying milk to the army was maintained. Ninety-three veterinary officers are certified and authorized to apply the tuberculin test to cattle intended for inter-state shipment and to issue certificates for movement of such animals. 254 tuberculin tests were carried out during the year on dairies at the various army posts and there were no positive reactions.

The average animal strength of the army for the calendar year 1937 was 23,792. Extent and reasons for mortality and sickness of army animals during the year are tabulated in detail.—F. T. BOYLE.

BOOK REVIEWS

HUNGERFORD, T. G. [B.V.Sc., H.D.A., Government Veterinary Officer, Stock Branch, Department of Agriculture, and Instructor in Poultry Diseases, Faculty of Veterinary Science, University of Sydney]. (1939). **Diseases of Poultry in New South Wales.** pp. 230. 1 plate, numerous figs., 1 table. Sydney, N.S.W.: Department of Agriculture. [8vo] [10s. 6d.]

As the title of this book indicates it has been written for those who come into contact with poultry disease during the course of their work amongst poultry in New South Wales. As a result, some diseases which are of major importance in many parts of the world but which do not occur in New South Wales receive little or no attention, *e.g.* fowl typhoid, fowl plague, Newcastle disease and infectious bronchitis. The general plan of the book is unusual in that an attempt has been made to group and deal with together, those diseases which have rather similar symptoms. This is considered to be of value to the poultry keeper who has had little training in pathology. It has the disadvantage that diseases which have quite different causes are dealt with together, *e.g.* fowl pox, laryngo-tracheitis and nutritional roup (hypovitaminosis A) are dealt with in a chapter entitled " Diseases

Classed as Roup ". In spite of this unfamiliar lay-out which does not detract from the value of the book for the purpose for which it has been written, the treatment of the individual diseases is good and in many cases very full ; each is examined as to cause, life-history of the causal organism in the case of parasites, the bacteriology of those caused by bacteria, the course of the disease, symptoms, P.M. findings, the part played by carriers and the control measures to be taken. The first chapter gives some notes on P.M. examination technique, the organs of the fowl and their positions in the body being well shown by numerous photographs and diagrams, the majority of which are good throughout the book. Some brief notes are given of more common cases of poisoning which may occur in poultry such as phosphorus, common salt, and copper sulphate.

The book should prove a very useful addition to those already published on poultry diseases.—L. E. Hughes.

Cameron, T. W. M. [T.D., M.A., B.Sc. (Vet.Sc.), Ph.D., D.Sc., M.R.C.V.S., F.R.S.C., Director, Institute of Parasitology, Professor of Parasitology, McGill University, Macdonald College, Quebec, Canada]. (1940). **The Principles of Parasite Control.** pp. 48. 1 fig. Gardenvale, Quebec : National Business Publications Ltd. [4to] [50 cents] [2s. 6d.]

This attractively-bound pamphlet is based on three lectures delivered in London under the auspices of the University of London, and is intended partly as a guide for the International Committee on the Control of Parasitic Diseases. It presents first in popular form the elementary principles of parasitology, the rest of the space being devoted to the various aspects of parasite control. The work of the author and his associates, especially on the treatment of manure, figures prominently in this connexion.—E. S.

Ritzman, E. G., & Benedict, F. G. (1938). **Nutritional Physiology of the Adult Ruminant.**—*Publ. Carneg. Instn.* No. 494. pp. 200. 3 text figs., 5 figs. on 3 plates, 55 tables. [Numerous refs.] Washington, D.C. : Carnegie Institution of Washington. [4to].

This monograph is a valuable addition to the science of nutrition as applied to ruminants. The subject is considered chiefly from the point of view of energy metabolism, as the authors have themselves specialized in this side of the subject. The study of metabolism in the ruminant, owing to the peculiarities of the digestive tract, presents many more difficulties than are encountered in man. Special methods for making the various measurements are needed, and the development of technique has occupied a large part of the authors' research.

The first part deals with the physiology of digestion, absorption and elimination of waste products. [The impression left after reading this section is that research is urgently needed on the processes of digestion in the ruminant. Comparatively little is known on this subject. The authors are aware that there is a deficiency in this respect, but suggest that studies on blood chemistry, from the point of view of nutrition, would do much to remedy the situation. This, however, appears rather illogical and a study of the chemical processes of digestion would be a better place to start, followed by a study of the metabolism of the end products of digestion.]

The second section deals with metabolism. The ruminant is peculiar in three ways in this respect. In the first place, the post-absorptive condition is not reached until the fourth day of fasting, in contrast to 12 hours in man ; secondly, the stimulating effect of food upon metabolism is very marked and, thirdly, the basal metabolism of the cow is very variable, differing in the same animal at different

times. Of the latter two peculiarities no convincing explanation has yet been found; the authors discuss factors which may affect the basal metabolism, and are of the opinion that differences in heredity and endocrine activity are responsible.

The last section deals with the evaluation of foodstuffs. A great deal of data is given in the tables and to anyone interested in nutritional physiology this monograph should be very useful.—A. T. PHILLIPSON.

REED, C. I. [A.M., Ph.D., Associate Professor in Physiology, University of Illinois], STRUCK, H. C. [Ph.D., Associate in Physiology, University of Illinois], & STECK, I. E. [M.S., M.D., Instructor in Physiology and in Medicine, University of Illinois]. (1939). **Vitamin D: Chemistry, Physiology, Pharmacology, Pathology, Experimental and Clinical Investigations.** pp. xii+389. 13 figs., 34 tables. [Numerous refs.] Chicago, Ill.; University of Chicago Press; London: Cambridge University Press. [8vo] [$4.50].

The amount of work that has appeared within recent years on the subject of vitamins is so vast that it is practically impossible for anyone not particularly specializing in this field to keep abreast of all the principal developments. Even workers within the field may not have a detailed knowledge of more than one particular vitamin or of some aspect of it such as its chemistry or clinical applications. The present monograph, dealing with the vitamin D complex is, therefore, an attempt to assemble concisely the principal findings that have so far been made. Its appeal is primarily to those concerned with human medicine and allied branches but, at the same time, the review is so wide as to interest veterinarians, chemists, nutritional workers, animal husbandry experts and the large number of commercial workers whose industries are based upon a sound knowledge of vitamin D. For this wide range of readers the authors have taken particular care to give as much as possible of the relevant data. In addition to a review of the existing literature, numerous results of the authors' own experimental inquiries are included.

In scope, the book includes discussions on the chemistry and the relative potency of the different forms of the vitamin D complex, of which 14 representatives are mentioned; assay methods and chemical tests; the relation of vitamin D to rickets; the physiology of vitamin D and its relation to the parathyroid glands; its influence on energy metabolism; toxic effects; effects on mineral metabolism; relation to resistance to infection; effects on blood constituents; and the uses of vitamin D in the treatment of arthritis, and various other therapeutic applications of the vitamin. An excellent feature of the book is the short resumé given at the end of each chapter summarizing the available evidence on each of the various points discussed.

Scientific workers who have some knowledge of the breadth of the research work that has already been carried out on vitamins realise that such a book as this, to quote the words of Dr. DAVIS in the preface, "... can only be regarded as a report of progress in a rapidly developing field" and that "... it is evidently not intended by the authors to conclude in final form even a single chapter". A most extensive bibliography is given which, the authors state, they have covered in original or in abstract, indicating the breadth of the field of the book, and one can feel sure that little of considerable importance has been omitted from the present survey.

The general arrangement, printing and binding are all excellent. The *Veterinary Bulletin* reader is recommended to make a careful note of this book as an informative authority on the vitamin D complex.—ALFRED EDEN.

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